COURSE OF STUDIES
for
Doctor of Philosophy
in
Histopathology

UNIVERSITY OF HEALTH SCIENCES, LAHORE PAKIST

PhD (Histopathology)

1. PROGRAM MISSION/RATIONAL

The mission of the PhD course is to produce high quality, patient centered knowledge and training with delivery of new scientific knowledge and its translation into clinical practice. The Ph.D scholar will lead nationally and internationally in research, academics and clinical innovations.

Our pathologists will:

- Follow international standards of diagnostic and technological services in surgical pathology, cytopathology and its subspecialties to support patient care.

- Contribute to keep the innovative standards in the health care system of the country in particular and the society at large by continuing professional development and through research in the field that will also help in deciding the targeted treatment of patients and long-term follow-up.

- Encourage interdisciplinary research by fostering collaboration between histopathologists, molecular biologists, clinicians, and other specialists.

2. PROGRAM OBJECTIVES

The objectives of PhD Program in Histopathology are to produce highly skilled and knowledgeable Pathologists that can report surgical pathology and cytopathology specimens independently. The PhD scholars are required to learn an in-depth and advanced understanding of histopathological principles, including the cellular and tissue-level changes associated with various diseases. Moreover, they will be trained to conduct original and significant research independently that contributes to the understanding of the disease pathology and advances the field of Histopathology.

3. PROGRAM LEARNING OUTCOMES

By the end of the program, the resident will be able to:

General Learning Outcomes:

- Keep up to date and practice evidence-based medicine.
- Maintain highest standards of practice.
- Participate in clinical governance and clinical audit.
- Demonstrate putting patients first.
- Demonstrate conflict resolution, management skills and leadership.
- Be an effective team player, leading the team if necessary.
- Communicate effectively with: - Patients and their attendants with empathy and compassion - seniors, peers, juniors, learners and other health professionals.

Specific Learning Outcomes:

- Obtain appropriate history to comprehend the presenting request for a pathological test.
- Collect / receive patient specimens according to prescribed protocol.
- Demonstrate research, and use of research in improving clinical practice.
- Design and conduct independent, original research projects in the field of Histopathology. Demonstrate a strong understanding of ethical principles in research, including the responsible conduct of research and the proper use of human and animal subjects in studies.
- Develop the ability to write competitive research grant proposals to secure funding for research projects.
- Gain experience in managing research budgets and resources.
- Demonstrate the ability to adapt to new technologies and methodologies in the rapidly evolving field of Histopathology.
- Perform requested tests.
- Interpret the results of tests and prepare reports to help clinicians make diagnoses.
- Apply the requisite knowledge and skills to think critically and solve problems.
- Demonstrate risk analysis.
- Ensure patient safety.
- Manage emergencies related to the specialty.
- Demonstrate honesty, integrity and timeliness (punctuality and task completion).
- Maintain confidentiality, patient autonomy, take appropriate consent and do no harm.
- Consults with colleagues and refer as necessary. Collaborate with experts from related fields, such as Molecular Biology, Genetics, and Clinical Medicine, to integrate multiple perspectives into the study of disease pathology.

- Exhibit advocacy for their patients, practice (service/ department), profession (discipline/specialty) and population-based problems related to their specialty.

Distribution of Courses and Credit hours

i) First Semester

No. of Courses	Credit Hours
Subject Specific Courses	6 (2 or 3 courses)
Core Courses	4 (2 courses)

ii) Second Semester

No. of Courses	Credit Hours
Subject Specific Courses	4 (2-3 course)
Core Course	4 (1 course)

PhD Advance Course Template

	Sr. #	Course code	Course/Subject	Credit Hours
Semester 1	1	ARM-801	Advance Research Methodology	02
	2	ABS-802	Advance Biostatistics	02
	3	Path-866	Special Pathology	04
Semester 2	4	Path-865	Advanced Diagnostic Methods in Pathology	02
	5	Path-866/ Path-867	Special Pathology/ Molecular Pathology	04
	6	ALT-803	Advanced Laboratory Techniques	04
Semester 3	7	Research (Thesis)		30
Total credit hours of course work				**48**

4. DETAIL OF PhD COURSE (Subject Specific)

Table: 1 Course Contents, Teaching and Assessment Strategies of the Module

Module Code and Title	Module Contents	Learning Outcomes	Duration of Didactic Teaching (Cr Hrs.)	Duration of Practical Teaching (Cr Hrs.)	Instructional Methodologies	Assessment	Reading Material
Advanced Diagnostic Methods in Pathology Path- 865	**Introduction to Histological Techniques**	At the end of the Course, students should be able to; • Demonstrate the practical knowledge and technical skills required to conduct routine testing in a histopathology laboratory • Develop practical skills in the transfer of tissue samples for histology and ancillary studies, including the ability to identify, orient, describe and select tissue samples required by pathologists for diagnosis and prognostic assessment. • Describe the work flow in a pathology laboratory • Apply analytical and technical skills to develop clinical reports of the standard required in an advanced pathology laboratory • Develop proficiency in methods used for freezing, fixing, sectioning and staining of frozen sections	• 0.25 • (1 hour per week for 4 weeks	• 0.25 • (1 hour per week for 8 weeks)	• Lectures • Multimedia Presentations • SGD • Demonstrations • Case studies • Assignments • Slide Seminars • E learning resources • Online videos	**Formative:** 2 formative assessments at the end of 3 weeks and 6 weeks. **Summative:** 1 summative assessment of Path-865 at the end of 8 weeks **Tools of Assessment** • Practical • Slides and tissues preparations • Quizzes • MCQs • SEQs • Logbook	• Bancroft's Theory and Practice of Histological Techniques, 7th Edition • Histology laboratory manual. 10th edition • E learning resources included internet based learning • Journals and e databases
	Immuno-histo-chemistry	At the end of the Course, students should be able to; ▪ Demonstrate the knowledge and skills related to basic techniques of immunohistochemistry including methods of antigen retrieval and trouble shootings ▪ Demonstrate how an immunohistochemistry lab is organized from specimen receipt to report generation. ▪ Demonstrate the knowledge and skills related to the performance and interpretation of the common immunohistochemistry tests and controls. ▪ Develop the ability to be judicious in ordering practices	• 0.125 • (1 hour per week for 2 weeks	• 0.125 • (1 hour per week for 4 weeks)	• Lectures • Multimedia Presentations • SGD • Demonstrations • Case studies • Assignments • Slide Seminars • E learning resources • Online videos	**Formative:** 2 formative assessments at the end of 3 weeks and 6 weeks. **Summative:** 1 summative assessment at the end of 8 weeks **Tools of Assessment** • Practical • Slides and tissues preparations • Quizzes • MCQs • SEQs • Logbook	• Bancroft's Theory and Practice of Histological Techniques, 7th Edition • Histology laboratory manual. 10th edition • E learning resources included internet based learning • Journals and e databases

Advanced Diagnostic Methods in Pathology Path- 865	**In situ Hybridization**	At the end of the Course, students should be able to; ▪ Demonstrate the knowledge and skills related to basic techniques of in situ hybridization. ▪ Demonstrate how an in situ hybridization lab is organized from specimen receipt to report generation. ▪ Demonstrate the knowledge and skills related to performance and interpretation of the common in situ hybridization tests and controls. ▪ Develop the ability to relate the test findings with the clinical settings for better patient care and raising the diagnostic efficacy	• 0.125 • (1 hour per week for 2 weeks	• 0.125 • (1 hour per week for 4 weeks)	• Lectures • Multimedia Presentations • SGD • Demonstrations • Case studies • Assignments • Slide Seminars • E learning resources • Online videos	Formative: 2 formative assessments at the end of 3 weeks and 6 weeks. Summative: 1 summative assessment at the end of 8 weeks Tools of Assessment • Practical • Slides and tissues preparations • Quizzes • MCQs • SEQs • Logbook	• Bancroft's Theory and Practice of Histological Techniques, 7th Edition • Histology laboratory manual. 10th edition • E learning resources included internet based learning Journals and e databases

Special Pathology Path-866	Laboratory Management & Quality Assurance	At the end of the Course, students should be able to; ▪ Develop an awareness of and responsiveness to the health care system, and in the broader national community. ▪ Understand the practices related to quality control required in the laboratory ▪ Understand accreditation requirements ▪ Document, notify and apply corrective actions, employing laboratory information systems where appropriate, in the event of incidents, errors and adverse events ▪ Promote timely and appropriate use of pathology investigations ▪ Apply, review and plan quality assurance strategies for monitoring processes and outputs in the laboratory ▪ Participate in auditor training and practice ▪ Practice appropriate laboratory safety measures	• 0.25 • (1 hour per week for 4 weeks	• 0.25 • (1 hour per week for 8 weeks	• Lectures • Multimedia Presentations • SGD • Demonstrations • Case studies /PBL • Assignments • Slide Seminars • E learning resources	**Formative:** 2 formative assessments at the end of 3 weeks and 6 weeks. **Summative:** 1 summative assessment of Path-866 at the end of 8 weeks **Tools of Assessment** • Practical • Slides and tissues preparations • Quizzes • MCQs • SEQs • Logbook	• Bancroft's Theory and Practice of Histological Techniques, 7th Edition • Histology laboratory manual. 10th edition • E learning resources included internet based learning Journals and e databases

Special Pathology **Path-866**	Cyto-pathology	At the end of the Course, students should be able to; ▪ Demonstrate the knowledge and skills related to the fundamentals of various specimen preparation techniques, including advantages and drawbacks of cytocentrifugation, membrane filtration, smears, and the new technology of monolayer ThinPreps. ▪ Appreciate the advantages and drawbacks of different staining methods such as wet fixed Papanicolaou versus air-dried modified Wright-Giemsa stains. ▪ Demonstrate the knowledge and skills related to proper specimen collection techniques for various specimen types including cervical/vaginal smears and fine needle aspiration specimens. ▪ Recognize cytomorphologic features of different cell types and range of normal morphology. ▪ Demonstrate the knowledge and skills related to the criteria of malignancy in various body sites and types of specimens. ▪ Gain experience in screening of cytology specimens to detect possibly rare abnormal cells amid a predominance of normal cells. ▪ Learn updated cytodiagnostic terminology, classification and grading systems for cervical/vaginal specimens. ▪ Describe the limitations of cytopathological diagnosis as compared to histopathologic diagnosis. ▪ Demonstrate the knowledge and skills related to the appropriate use of ancillary diagnostic techniques such as immunocytochemistry and electron microscopy in the work-up of diagnostics in cytopathology. ▪ Demonstrate the knowledge and skills related to the fundamentals of quality assurance methods in pathology, particularly as applied to cytopathology.	• 0.25 • (1 hour per week for 4 weeks	• 0.25 • (1 hour per week for 8 weeks)	• Lectures • Multimedia Presentations • SGD • Demonstrations • Case studies /PBL • Assignments • Slide Seminars • E learning resources	**Formative:** 2 formative assessments at the end of 3 weeks and 6 weeks. **Summative:** 1 summative assessment of Path-866 at the end of 8 weeks Tools of Assessment • Practical • Slides and tissues preparations • Quizzes • MCQs • SEQs • Logbook	• Diagnostic Cytopathology by Winifred Grey. 8th Edition • E learning resources included internet based learning • Journals and e databases

Special Pathology Path-866	**Hemato-pathology**	At the end of the Course, students should be able to; ▪ Prepare, stain and interpret the specimens in the field of hematopathology. ▪ Think critically and in innovative ways about problems in hematopathology and to correlate them with the histopathological findings for better clinical care, scientific inquiry, and productivity.	• 0.25 • (1 hour per week for 4 weeks	• 0.25 • (1 hour per week for 8 weeks)	• Lectures • Multimedia Presentations • SGD • Demonstrations • Case studies / /PBL • Assignments • Slide Seminars • E learning resources	**Formative:** 2 formative assessments at the end of 3 weeks and 6 weeks. **Summative:** 1 summative assessment of Path-866 at the end of 8 weeks Tools of Assessment • Practical • Slides and tissues preparations • Quizzes • MCQs • SEQs • Logbook	• Hematopathology by Elaine S. Jaffe. 2014 • Hematology Basic Principles and Practice by Ronald Hoffman, 10th Ed. • E learning resources included internet based learning • Journals and e databases
	Forensic Pathology	At the end of the Course, students should be able to; ▪ Demonstrate the knowledge and skills related to the application of the principles and practice of forensic pathology. ▪ Develop a systematic approach to the forensic autopsy, including evaluation of gross, microscopic, biochemical, and genetic evidence. ▪ Interpret and correlate the postmortem pathologic findings with other clinical, laboratory, and evidentiary data. ▪ Demonstrate the knowledge and skills for presentation of autopsy findings to official personnel from the medical, legal, and investigative communities	• 0.25 • (1 hour per week for 4 weeks	• 0.25 • (1 hour per week for 8 weeks)	• Lectures • Multimedia Presentations • SGD • Demonstrations • Case studies //PBL • Assignments • Slide Seminars • E learning resources • Online videos	**Formative:** 2 formative assessments at the end of 3 weeks and 6 weeks. **Summative:** 1 summative assessment of Path- 866 at the end of 8 weeks **Tools of Assessment** • Practical • Slides and tissues preparations • Quizzes • MCQs • SEQs • Logbook	• Autopsy Pathology, A Manual & Atlas by Walter E. Finkbeiner. 2nd edition • E learning resources included internet based learning • Journals and e databases

Molecular Pathology Path-867	**Molecular Pathology**	At the end of the Course, students should be able to; ▪ Demonstrate the knowledge and skills related to the basic techniques of nucleic acid handling, including proper storage of tissue samples and the extraction of intact materials from tissue samples. ▪ Demonstrate the knowledge and skills for basic polymerase chain reaction (PCR) techniques to amplify targeted DNA from tissue samples and selection of primers and proper controls. ▪ Demonstrate how a molecular diagnostics lab is organized from specimen receipt to report generation. ▪ Demonstrate the knowledge and skills to perform and interpret the common molecular tests. ▪ Apply analytical and technical skills to develop clinical reports of the standard required in a clinical genetics/genomics laboratory.	• 0.25 • (1 hour per week for 4 weeks	• 0.25 • (1 hour per week for 8 weeks)	• Lectures • Multimedia Presentations • SGD • Demonstrations • Case studies /PBL • Assignments • Slide Seminars • E learning resources	**Formative:** 2 formative assessments at the end of 3 weeks and 6 weeks. **Summative:** 1 summative assessment of Path-867 at the end of 8 weeks **Tools of Assessment** • Practical • Slides and tissues preparations • Quizzes • MCQs • SEQs • Logbook	• Essential Concepts in Molecular Pathology by William Coleman. 3RD edition • Basic Concepts of Molecular Pathology by Timothy Craig, 6TH edition. • E learning resources included internet based learning • Journals and e databases

Suggested Readings

1. Walter & Israel General Pathology 7th Edition by J.B. Walter.
2. Robbins & Cotran Pathologic Basis of Disease, 10th Edition by Vinay Kumar, Abul K. Abbas, Jon C. Aster
3. Lever's Dermatopathology: Histopathology of the Skin, 12th Edition by David E Elder.
4. Rosai and Ackerman's Surgical Pathology, 11th Edition by John R. Goldblum, Laura W. Lamps, Jesse K. McKenney, Jeffrey L. Myers
5. Mills and Sternberg's Diagnostic Surgical Pathology, 7th Edition, by Teri A. Longacre.
6. Atlas of Tumor Pathology [Fascicles] by the Armed Forces Institute of Pathology in Washington, DC.
7. Principles and Techniques of Surgical Pathology by Waldemar A. Schmidt.
8. Theory and practice of histological techniques, 8th Edition by S. Kim Suvarna, Christopher Layton, John D. Bancroft.
9. Geeenfields's Neuropathology, 10th Edition by Colin Smith, Arie Perry, Gabor Kovacs, Thomas Jacques.
10. Surgical pathology of the GT tract, Liver, Biliary tract and Pancreas, 4th Edition by Robert D. Odze, John R. Goldblum.
11. WHO classification of Tumors [series] by International Agency for Research on Cancer (IARC) Publications.
12. AFIP Laboratory Methods in Histotechnology, 1st Edition by Edna B. Prophet, Bob Mills, Jacquelyn B. Arrington, Leslie H. Sobin.
13. AFIP Advanced Laboratory Methods in Histology and Pathology, 1st Edition by Ulrika V. Mikel.
14. Porth's Essentials of Pathophysiology, 5th Edition by Tommie L Norris.
15. Diagnostic Cytopathology, 3rd Edition by Winifred Gray, Gabrijela Kocjan.
16. Dacie and Lewis Practical Haematology, 12th Edition by Barbara J. Bain, Imelda Bates and Mike A Laffan.
17. Clinical Pathology Interpretations, 4th Edition by A.H.Nagi.
18. Practical Guide for Health Researchers by World Health Organization, Regional Office for the Eastern Mediterranean, Cairo, 2004.

Website for Histopathology:

http://www.uhs.edu.pk/Academics/pathology.html

Compulsory Teaching Skills

For a thorough evaluation of students' understanding and critical thinking abilities, all PhD students in their respective disciplines will;

1. Design a comprehensive set of 50 Multiple Choice Questions (MCQs) and 25 Short Essay Questions (SEQs) for M. Phil students.

2. Plan 20 observed lectures focusing on key topics.

These assessments will provide Ph.D. students valuable experience in educational design and delivery. These will also enhance their interactive learning with the provision of real-time feedback.