Department of Radio-Diagnosis

S.No	Name of the Fellowship	Eligibility	Duration
01	Fellowship in Fetal Medicine	MD/DNB Radio, MS/DNB in OBGY	1 yr
02	Fellowship in Interventional Radiology	MD/DNB Radio-Diag	1 yr
03	Fellowship in Vascular Interventional Radiology	MD/DNB Radio-Diag DM/DNB Cardio, M.Ch./DNB CTVS	1 yr
04	Fellowship in Neuro Interventional Radiology	MD/DNB Radio-Diag DM/DNB Neuro, Inter Radio, M.Ch./DNB in Neuro Surg	1 yr
05	Fellowship in Abdominal Interventional Radiology	MD/DNB Radio-Diag DM/DNB Med Gastro, Inter Radio, M.Ch./DNB Surg Gastro	1 yr
06	Fellowship in Cardiac Imaging	MD/DNB Radio-Diag DM/DNB Cardio, M.Ch./DNB in CTVS	1 yr
07	Fellowship in Neuro Imaging	MD/DNB Radio-Diag DM/DNB Neuro, M.Ch./DNB in Neuro Surg	1 yr
08	Fellowship in Abdominal Imaging (Gl & GU)	MD/DNB Radio-Diag DM/DNB Med Gastro, M.Ch./DNB in Surg Gastro	1 yr
09	Fellowship in Cross Sectional Imaging	MD/DNB Radio-Diag	1 yr
10	Fellowship in Breast Imaging (Women's)	MD/DNB Radio-Diag, Rad Onco, MS/DNB surg, OBGY DM/DNB Med Onco, M.Ch./DNB in sur Onco	1 yr
11	Fellowship in Nuclear Medicine	MD/DNB Radio-Diag, Radio Onco DM/DNB Med Onco, M.Ch./DNB in surg Onco	1 yr
12	Fellowship in Onco-Radiology	MD/DNB Radio-Diag, Radio Onco DM/DNB Med Onco, M.Ch./DNB in surg Onco	1 yr
13	Fellowship in Musculoskeletal Imaging	MD/DNB Radio-Diag, MS/DNB in Ortho	1 yr
14	Fellowship in Head & Neck Imaging	MD/DNB Radio-Diag, MS/DNB in ENT, Ortho	1 yr
15	Fellowship in Emergency & Trauma Radiology	MD/DNB Radio-Diag , Anaes, Emer	1 yr

		Med	
16	Fellowship in Pediatric Radiology	MD/DNB Radio-Diag, Paed	1 yr

Fellowship in Fetal Medicine

Course Overview

The Fellowship in Fetal Medicine is a one-year advanced training program designed for obstetricians, gynecologists, and other healthcare professionals who wish to specialize in the management of high-risk pregnancies and fetal medicine. This fellowship equips participants with in-depth knowledge and hands-on experience in the detection, diagnosis, and management of fetal anomalies, as well as the use of advanced diagnostic tools like ultrasound, amniocentesis, and fetal MRI. Fellows will learn to manage complex fetal conditions, provide counseling to expectant parents, and work closely with multidisciplinary teams to optimize maternal and fetal outcomes.

Prerequisites

Criteria	Details
Eligibility	MD in Obstetrics & Gynecology or equivalent degree in medical field
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain expertise in the prenatal diagnosis and management of fetal anomalies, including genetic, structural, and functional disorders.
- Master the use of advanced diagnostic technologies, including fetal ultrasound, Doppler studies, and amniocentesis.
- Develop proficiency in performing invasive procedures such as amniocentesis, chorionic villus sampling (CVS), and fetal blood sampling.
- Understand the principles of fetal interventions, including in-utero surgeries and treatments for fetal conditions like hydrops or congenital diaphragmatic hernia.
- Learn the principles of maternal-fetal medicine and its role in high-risk pregnancy management.
- Improve communication and counseling skills to deliver complex, sensitive information to parents regarding fetal health and pregnancy management.
- Contribute to ongoing research in fetal medicine, including advancements in prenatal diagnostics and fetal therapies.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Foundations of Fetal Medicine

Module	Topics Covered
Introduction to Fetal Medicine	Overview of fetal medicine, history, and evolution of prenatal care, ethical considerations in fetal medicine
Fetal Development and Physiology	Understanding fetal development, the role of the placenta, and fetal circulatory system
Prenatal Screening and Diagnosis	Screening methods for fetal anomalies, first trimester screening, ultrasound in prenatal care
Ultrasound in Fetal Medicine	Basics of obstetric ultrasound, 3D/4D ultrasound, fetal imaging, and Doppler studies for assessment of fetal well-being
Genetic Screening and Counseling	Chromosomal abnormalities, genetic screening techniques, preconception counseling, and invasive procedures for genetic testing
Clinical Rotations & Hands-on Training	Practical experience in fetal ultrasound, diagnostic procedures, and management of common fetal conditions

Semester 2: Advanced Fetal Medicine and Interventions

Module	Topics Covered
Fetal Anomalies	Diagnosis and management of common fetal anomalies such as neural tube defects, congenital heart defects, and structural abnormalities
Invasive Diagnostic Procedures	Amniocentesis, chorionic villus sampling (CVS), fetal blood sampling, and their indications, risks, and interpretations
Fetal Surgery and Interventions	Fetal treatments for conditions like congenital diaphragmatic hernia, spina bifida, and hydrops fetalis
Maternal-Fetal Medicine	The role of maternal health in fetal development, managing high-risk pregnancies, and preterm labor prevention
Multiple Pregnancies and Complications	Managing twin and multiple pregnancies, and complications such as twin-to-twin transfusion syndrome (TTTS) and preeclampsia
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation on fetal medicine topics

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Fetal Diagnosis and Monitoring	Ability to perform and interpret advanced diagnostic techniques such as fetal ultrasound, amniocentesis, and fetal MRI for detecting fetal abnormalities.
2	Advanced Knowledge in Fetal Anomalies	In-depth understanding of the pathophysiology, diagnosis, and management of fetal structural and genetic anomalies.
3	Proficiency in Fetal Interventions	Ability to perform and manage invasive fetal procedures, including amniocentesis, CVS, fetal blood sampling, and in-utero surgeries.
4	Maternal-Fetal Medicine Expertise	Understanding the importance of maternal health and management in high-risk pregnancies, including prevention and management of preterm labor and other complications.
5	Effective Patient Counseling and Communication	Ability to deliver complex and sensitive information to expectant parents and provide counseling on fetal conditions and treatment options.
6	Research Contribution to Fetal Medicine	Conduct research in fetal medicine to improve prenatal diagnostics, fetal interventions, and maternal-fetal outcomes.

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Prenatal Diagnosis	Ability to diagnose and assess fetal health using advanced diagnostic tools such as ultrasound and genetic screening.
2	Expertise in Invasive Procedures	Ability to perform and interpret invasive diagnostic and therapeutic procedures, such as amniocentesis, CVS, and fetal blood sampling.
3	Proficiency in Fetal Intervention Techniques	Knowledge of fetal surgical interventions and treatments for conditions such as congenital diaphragmatic hernia and spina bifida.
4	Competence in Maternal-Fetal Care	Ability to manage high-risk pregnancies, including the management of multiple pregnancies, preterm labor, and other complications.
5	Effective Communication and Counseling	Ability to provide sensitive, evidence-based counseling and support to families regarding fetal conditions and pregnancy

Sr. No.	Course Outcome	Description
		management.
6	Contribution to Fetal Medicine Research	Ability to conduct original research in fetal medicine, contributing to the advancement of diagnostic and therapeutic techniques.

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Fetal Ultrasound & Diagnosis	Performing and interpreting fetal ultrasounds, 3D/4D imaging, and Doppler studies for assessing fetal well-being	50
Invasive Procedures	Performing and interpreting amniocentesis, CVS, and fetal blood sampling	50
Fetal Intervention Techniques	Demonstrating knowledge and techniques for fetal surgery and treatments for conditions like hydrops and spina bifida	30

Component	Details	Marks
OSCE	Simulated clinical scenarios, fetal assessments, and decision-making	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Presenting complex fetal cases involving anomalies or high-risk pregnancies	50
Recent Advances in Fetal Medicine	Discussion on recent developments in prenatal diagnostics and fetal therapies	20
Ethical & Legal Aspects in Fetal Medicine	Ethical considerations in performing fetal procedures and counseling expectant parents	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Fetal Medicine: Basic Science and Clinical Applications – Charles H. Rodeck
- Ultrasound in Obstetrics and Gynecology – Peter W. Callen
- Comprehensive Fetal Medicine – David A. Miller
- Clinical Obstetrics: The Fetal and Maternal Perspective – Robert S. Sholl

Journals & E-Resources:

- Fetal Diagnosis and Therapy – https://www.karger.com/Journal/Home/223850
- Prenatal Diagnosis – https://onlinelibrary.wiley.com/journal/10970223
- American Journal of Obstetrics and Gynecology – https://www.ajog.org/
- The Society for Maternal-Fetal Medicine – https://www.smfm.org/

Fellowship in Interventional Radiology

Course Overview

The Fellowship in Interventional Radiology (IR) is a one-year advanced training program designed for physicians who wish to specialize in the field of interventional radiology. This fellowship offers extensive exposure to minimally invasive procedures that utilize imaging guidance for diagnostic and therapeutic interventions. Fellows will gain in-depth knowledge and hands-on experience in a wide range of interventional techniques such as angioplasty, embolization, biopsy, drainage, and ablation. The course prepares fellows to treat a variety of conditions across multiple organ systems, while also focusing on safety, patient care, and collaboration with multidisciplinary teams.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain expertise in performing minimally invasive procedures guided by imaging techniques such as fluoroscopy, CT, ultrasound, and MRI.
- Develop skills in vascular interventions, including angiography, angioplasty, and embolization for various conditions.
- Understand the principles of image-guided biopsies, drainage procedures, and the management of malignant and benign lesions.
- Master the techniques of tumor ablation, including radiofrequency ablation (RFA), cryoablation, and microwave ablation for cancer treatment.
- Learn how to manage and treat conditions like liver disease, renal disease, uterine fibroids, and peripheral arterial disease.
- Focus on patient safety, radiation protection, and the ethical considerations of performing interventional procedures.
- Conduct research to advance the field of interventional radiology and explore new techniques and technologies.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Interventional Radiology

Module	Topics Covered
Introduction to Interventional Radiology	History, scope, and principles of interventional radiology, overview of procedures
Basic Imaging Techniques	Principles of imaging modalities: fluoroscopy, CT, MRI, ultrasound in IR
Vascular Interventions	Angiography, angioplasty, stenting, endovenous laser therapy (EVLT), embolization techniques
Biopsy and Drainage Procedures	Image-guided biopsy techniques, percutaneous drainage of abscesses, fluid collections, and malignancies
Non-vascular Interventions	Interventional treatments for non-vascular conditions, such as uterine fibroid embolization and dialysis access
Clinical Rotations & Hands-on Training	Practical experience in performing IR procedures and diagnostics

Semester 2: Advanced Interventional Techniques

Module	Topics Covered
Oncological Interventions	Tumor ablation techniques: radiofrequency ablation (RFA), cryoablation, microwave ablation
Interventional Nephrology	Dialysis access, nephrostomy, renal artery interventions, and management of renal malignancies
Liver Interventions	Transarterial chemoembolization (TACE), percutaneous liver biopsy, treatment of hepatocellular carcinoma (HCC)
Endovenous and Peripheral Interventions	Endovenous laser therapy (EVLT), sclerotherapy, treatment of peripheral arterial disease (PAD)
Pediatric Interventional Radiology	Pediatric-specific procedures, including biopsy, drainage, and vascular interventions
Research Project & Case Studies	Literature review, clinical case presentations, preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Minimally Invasive Techniques	Mastery of imaging-guided minimally invasive procedures, such as angiography, embolization, biopsy, and ablation.
2	Advanced Knowledge in Vascular and Non-Vascular Interventions	Proficiency in both vascular (e.g., angioplasty, stenting) and non-vascular interventions (e.g., uterine fibroid embolization, dialysis access).
3	Competence in Oncological Interventions	Ability to perform image-guided tumor ablation (RFA, cryoablation, microwave ablation) and manage oncological conditions.
4	Mastery of Image-Guided Biopsy and Drainage Procedures	Ability to perform image-guided biopsies, fluid drainage, and manage benign and malignant lesions.
5	Patient Safety and Radiation Protection	Emphasis on patient safety, radiation protection protocols, and ethical considerations in IR procedures.
6	Contribution to Interventional Radiology Research	Active participation in research, aiming to advance the field of interventional radiology and improve patient outcomes.

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery of Interventional Radiology Procedures	Ability to independently perform a variety of IR procedures such as angiography, embolization, biopsy, and ablation.
2	Proficiency in Diagnostic and Therapeutic Imaging	Expertise in utilizing various imaging modalities, including fluoroscopy, CT, MRI, and ultrasound, for guiding interventions.
3	Competence in Oncological and Non-Oncological Interventions	Ability to perform complex interventions such as tumor ablation and endovenous laser therapy, treating both cancerous and non-cancerous conditions.
4	Expertise in Management of	Ability to perform vascular interventions, including

Sr. No.	Course Outcome	Description
	Vascular Disease	angioplasty, stenting, and embolization, and treat conditions like peripheral arterial disease and varicose veins.
5	Ability to Perform Image-Guided Biopsy and Drainage	Ability to perform biopsies, fluid drainage procedures, and treat complications arising from malignant and benign lesions.
6	Research in Interventional Radiology	Ability to conduct original research in IR, contributing to the advancement of the field and improving clinical practices.

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Vascular Procedures	Angiography, angioplasty, stenting, and embolization techniques	50
Oncological Interventions	Performing tumor ablation (RFA, cryoablation, microwave ablation)	50

Component	Details	Marks
Non-Vascular Procedures	Uterine fibroid embolization, dialysis access, and biopsy/drainage procedures	30
OSCE	Simulated clinical scenarios, decision-making, and procedural demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Presenting complex cases involving IR procedures and clinical decision-making	50
Recent Advances in Interventional Radiology	Discussion on recent innovations and developments in IR technologies and techniques	20
Ethical & Legal Aspects in IR	Discussion on the ethical and legal considerations of interventional radiology practices	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Interventional Radiology: A Survival Guide – Geoffery D. Rubin
- Interventional Radiology: Principles and Practice – William R. Lee
- Vascular and Interventional Radiology – Richard S. Shlansky-Goldberg
- Practical Interventional Radiology – H. B. Hwang

Journals & E-Resources:

- Journal of Vascular and Interventional Radiology – https://www.jvir.org/
- European Journal of Radiology – https://www.journals.elsevier.com/european-journal-of-radiology
- Radiology – https://pubs.rsna.org/journal/radiology

Fellowship in Interventional Radiology

Course Overview
The Fellowship in Interventional Radiology (IR) is a one-year advanced training program designed for physicians who wish to specialize in the field of interventional radiology. This fellowship offers extensive exposure to minimally invasive procedures that utilize imaging guidance for diagnostic and therapeutic interventions. Fellows will gain in-depth knowledge and hands-on experience in a wide range of interventional techniques such as angioplasty, embolization, biopsy, drainage, and ablation. The course prepares fellows to treat a variety of conditions across multiple organ systems, while also focusing on safety, patient care, and collaboration with multidisciplinary teams.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain expertise in performing minimally invasive procedures guided by imaging techniques such as fluoroscopy, CT, ultrasound, and MRI.
- Develop skills in vascular interventions, including angiography, angioplasty, and embolization for various conditions.
- Understand the principles of image-guided biopsies, drainage procedures, and the management of malignant and benign lesions.
- Master the techniques of tumor ablation, including radiofrequency ablation (RFA), cryoablation, and microwave ablation for cancer treatment.

- Learn how to manage and treat conditions like liver disease, renal disease, uterine fibroids, and peripheral arterial disease.
- Focus on patient safety, radiation protection, and the ethical considerations of performing interventional procedures.
- Conduct research to advance the field of interventional radiology and explore new techniques and technologies.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Interventional Radiology

Module	Topics Covered
Introduction to Interventional Radiology	History, scope, and principles of interventional radiology, overview of procedures
Basic Imaging Techniques	Principles of imaging modalities: fluoroscopy, CT, MRI, ultrasound in IR
Vascular Interventions	Angiography, angioplasty, stenting, endovenous laser therapy (EVLT), embolization techniques
Biopsy and Drainage Procedures	Image-guided biopsy techniques, percutaneous drainage of abscesses, fluid collections, and malignancies
Non-vascular Interventions	Interventional treatments for non-vascular conditions, such as uterine fibroid embolization and dialysis access
Clinical Rotations & Hands-on Training	Practical experience in performing IR procedures and diagnostics

Semester 2: Advanced Interventional Techniques

Module	Topics Covered
Oncological Interventions	Tumor ablation techniques: radiofrequency ablation (RFA), cryoablation, microwave ablation
Interventional Nephrology	Dialysis access, nephrostomy, renal artery interventions, and management of renal malignancies
Liver Interventions	Transarterial chemoembolization (TACE), percutaneous liver

Module	Topics Covered
	biopsy, treatment of hepatocellular carcinoma (HCC)
Endovenous and Peripheral Interventions	Endovenous laser therapy (EVLT), sclerotherapy, treatment of peripheral arterial disease (PAD)
Pediatric Interventional Radiology	Pediatric-specific procedures, including biopsy, drainage, and vascular interventions
Research Project & Case Studies	Literature review, clinical case presentations, preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Minimally Invasive Techniques	Mastery of imaging-guided minimally invasive procedures, such as angiography, embolization, biopsy, and ablation.
2	Advanced Knowledge in Vascular and Non-Vascular Interventions	Proficiency in both vascular (e.g., angioplasty, stenting) and non-vascular interventions (e.g., uterine fibroid embolization, dialysis access).
3	Competence in Oncological Interventions	Ability to perform image-guided tumor ablation (RFA, cryoablation, microwave ablation) and manage oncological conditions.
4	Mastery of Image-Guided Biopsy and Drainage Procedures	Ability to perform image-guided biopsies, fluid drainage, and manage benign and malignant lesions.
5	Patient Safety and Radiation Protection	Emphasis on patient safety, radiation protection protocols, and ethical considerations in IR procedures.
6	Contribution to Interventional Radiology Research	Active participation in research, aiming to advance the field of interventional radiology and improve patient outcomes.

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery of Interventional	Ability to independently perform a variety of IR procedures

Sr. No.	Course Outcome	Description
	Radiology Procedures	such as angiography, embolization, biopsy, and ablation.
2	Proficiency in Diagnostic and Therapeutic Imaging	Expertise in utilizing various imaging modalities, including fluoroscopy, CT, MRI, and ultrasound, for guiding interventions.
3	Competence in Oncological and Non-Oncological Interventions	Ability to perform complex interventions such as tumor ablation and endovenous laser therapy, treating both cancerous and non-cancerous conditions.
4	Expertise in Management of Vascular Disease	Ability to perform vascular interventions, including angioplasty, stenting, and embolization, and treat conditions like peripheral arterial disease and varicose veins.
5	Ability to Perform Image-Guided Biopsy and Drainage	Ability to perform biopsies, fluid drainage procedures, and treat complications arising from malignant and benign lesions.
6	Research in Interventional Radiology	Ability to conduct original research in IR, contributing to the advancement of the field and improving clinical practices.

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Vascular Procedures	Angiography, angioplasty, stenting, and embolization techniques	50
Oncological Interventions	Performing tumor ablation (RFA, cryoablation, microwave ablation)	50
Non-Vascular Procedures	Uterine fibroid embolization, dialysis access, and biopsy/drainage procedures	30
OSCE	Simulated clinical scenarios, decision-making, and procedural demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Presenting complex cases involving IR procedures and clinical decision-making	50
Recent Advances in Interventional Radiology	Discussion on recent innovations and developments in IR technologies and techniques	20
Ethical & Legal Aspects in IR	Discussion on the ethical and legal considerations of interventional radiology practices	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)

Exam Component	Total Marks	Minimum Passing Marks
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Interventional Radiology: A Survival Guide – Geoffery D. Rubin
- Interventional Radiology: Principles and Practice – William R. Lee
- Vascular and Interventional Radiology – Richard S. Shlansky-Goldberg
- Practical Interventional Radiology – H. B. Hwang

Journals & E-Resources:

- Journal of Vascular and Interventional Radiology – https://www.jvir.org/
- European Journal of Radiology – https://www.journals.elsevier.com/european-journal-of-radiology
- Radiology – https://pubs.rsna.org/journal/radiology

Fellowship in Vascular Interventional Radiology

Course Overview

The Fellowship in Vascular Interventional Radiology is a one-year advanced training program aimed at healthcare professionals who wish to specialize in the diagnosis and treatment of vascular conditions using minimally invasive, image-guided procedures. Fellows will gain in-depth knowledge and hands-on experience in vascular interventional techniques, such as angiography, angioplasty, stenting, and embolization. The course is designed to equip fellows with the skills needed to treat a range of vascular diseases, including peripheral arterial disease (PAD), aneurysms, varicose veins, and venous insufficiency.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology, Surgery, or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Develop expertise in the use of imaging modalities, such as fluoroscopy, ultrasound, CT, and MRI, to guide vascular interventions.
- Master techniques in angiography, angioplasty, stenting, and embolization for the treatment of vascular diseases.
- Gain proficiency in the treatment of peripheral arterial disease (PAD), including endovenous procedures and stent placements.
- Understand the principles and techniques for treating venous conditions, including varicose veins and venous insufficiency.
- Learn how to manage aneurysms, including endovascular repair and stent graft placement.
- Focus on patient safety, radiation protection, and ethical considerations in vascular interventional procedures.
- Engage in research to explore new methodologies and advancements in vascular interventional radiology.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Vascular Interventional Radiology

Module	Topics Covered
Introduction to Vascular Interventional Radiology	Overview of vascular diseases, imaging modalities, and interventional techniques
Basic Vascular Imaging	Angiography, duplex ultrasound, CT angiography (CTA), and magnetic resonance angiography (MRA)
Peripheral Arterial Disease (PAD)	Diagnosis, treatment, and management of PAD; techniques for angioplasty, stenting, and atherectomy
Venous Interventions	Endovenous laser treatment (EVLT), sclerotherapy, stenting, and treatment of varicose veins
Aneurysms and Endovascular Repair	Diagnosis and treatment of aneurysms, including endovascular repair and stent graft placement
Clinical Rotations & Hands-on Training	Practical experience in performing vascular interventions guided by imaging

Semester 2: Advanced Vascular Interventions and Research

Module	Topics Covered

Module	Topics Covered
Endovenous and Endovascular Procedures	Endovenous laser therapy (EVLT), ultrasound-guided foam sclerotherapy, endovascular stent grafting for aneurysms
Aortic and Renal Interventions	Endovascular repair of aortic aneurysms, renal artery stenting, and treatment of renovascular hypertension
Interventional Management of Venous Disease	Techniques for treating deep vein thrombosis (DVT), chronic venous insufficiency, and inferior vena cava (IVC) filter placement
Oncology and Vascular Interventions	Tumor embolization, radiofrequency ablation (RFA) for vascular tumors, and management of hypervascular lesions
Research Project & Case Studies	Literature review, clinical case presentations, preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Vascular Interventions	Mastery in performing vascular interventional procedures such as angioplasty, stenting, and embolization for PAD, venous disease, and aneurysms.
2	Proficiency in Diagnostic Imaging	Advanced knowledge of imaging modalities including angiography, ultrasound, CTA, and MRA for vascular interventions.
3	Competence in Endovenous and Endovascular Procedures	Expertise in the treatment of varicose veins, venous insufficiency, and endovascular repair of aneurysms.
4	Patient Safety and Ethical Considerations	Commitment to patient safety, radiation protection, and adherence to ethical standards in vascular interventional radiology.
5	Contribution to Vascular Interventional Radiology Research	Active engagement in research and clinical trials aimed at improving vascular intervention techniques and patient outcomes.
6	Advanced Clinical Decision-Making Skills	Ability to make informed, evidence-based decisions for managing complex vascular diseases in a multidisciplinary

Sr. No.	Program Outcome	Description
		clinical environment.

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Vascular Interventional Procedures	Ability to independently perform angioplasty, stenting, embolization, and endovenous procedures to treat vascular conditions.
2	Advanced Skills in Diagnostic Vascular Imaging	Expertise in interpreting and utilizing imaging techniques such as angiography, CTA, MRA, and ultrasound to guide interventions.
3	Competence in Treating Peripheral Arterial Disease (PAD)	Ability to treat PAD through interventional techniques including stenting, balloon angioplasty, and atherectomy.
4	Expertise in Managing Venous Disorders	Proficiency in treating venous conditions like varicose veins, deep vein thrombosis (DVT), and chronic venous insufficiency using endovenous techniques.
5	Proficiency in Endovascular Aneurysm Repair	Ability to perform endovascular aneurysm repair (EVAR) and manage other vascular abnormalities such as aortic and renal artery disease.

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%

Assessment Type	Weightage
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Vascular Procedures	Angioplasty, stenting, embolization techniques for PAD, venous disease, aneurysms	50
Endovenous Procedures	Performing EVLT, foam sclerotherapy, and varicose vein treatments	50
Aneurysm Repairs	Endovascular repair for aneurysms, stent graft placement	30
OSCE	Simulated clinical scenarios and skill demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Presenting vascular intervention cases and clinical decisions	50
Recent Advances in Vascular IR	Discussion on recent innovations in vascular interventional radiology	20
Ethical & Legal Aspects	Ethical considerations and patient care in vascular IR procedures	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Interventional Radiology: A Practical Guide – H. C. S. Rees
- Endovenous Procedures in Vascular Interventional Radiology – Robert D. Geller
- Vascular Interventional Radiology – David L. Cohn
- Endovascular Surgery: Principles and Techniques – James F. O'Donnell

Journals & E-Resources:

- Journal of Vascular and Interventional Radiology – https://www.jvir.org/
- European Journal of Vascular and Endovascular Surgery – https://www.journals.elsevier.com/european-journal-of-vascular-and-endovascular-surgery
- Radiology – https://pubs.rsna.org/journal/radiology
- Society of Interventional Radiology – https://www.sirweb.org/

Fellowship in Neuro Interventional Radiology

Course Overview
The Fellowship in Neuro Interventional Radiology is a one-year advanced training program designed for healthcare professionals who want to specialize in the diagnosis and minimally invasive treatment of neurovascular conditions. This fellowship provides in-depth training in advanced neuroimaging techniques, such as cerebral angiography, CT angiography, and MRI, alongside a range of interventional procedures, including endovascular treatment of strokes, aneurysms, arteriovenous malformations (AVMs), and other neurovascular disorders. Fellows will gain hands-on experience with state-of-the-art technology, preparing them to treat complex neurovascular diseases using minimally invasive methods.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology, Neurology, Neurosurgery, or equivalent medical degree

Criteria	Details
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain expertise in neurovascular imaging techniques, including cerebral angiography, CT, and MRI angiography.
- Develop proficiency in performing endovascular interventions for stroke management, cerebral aneurysms, arteriovenous malformations (AVMs), and intracranial stenosis.
- Master catheter-based procedures for the management of acute ischemic stroke (thrombectomy) and chronic neurovascular conditions.
- Learn the principles and techniques for treating carotid artery disease, vertebrobasilar insufficiency, and intracranial hemorrhages.
- Understand the use of interventional techniques for brain tumors and other vascular malformations.
- Focus on patient safety, radiation protection, and ethical considerations in neuro-interventional procedures.
- Engage in research to explore new methodologies and advancements in neuro-interventional radiology.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Neuro Interventional Radiology

Module	Topics Covered
Introduction to Neuro Interventional Radiology	Overview of neurovascular diseases, imaging techniques, and interventional radiology tools
Neurovascular Imaging Techniques	Cerebral angiography, CT and MR angiography, and advanced neuroimaging modalities
Stroke and Acute Ischemic Stroke Management	Acute stroke treatment with thrombectomy, thrombolysis, and mechanical thrombectomy techniques
Aneurysms and Arteriovenous Malformations (AVMs)	Endovascular treatment of aneurysms and AVMs, including coiling and embolization procedures

Module	Topics Covered
Carotid Artery Disease and Vertebrobasilar Insufficiency	Techniques for managing carotid artery disease and vertebrobasilar insufficiency with stenting and balloon angioplasty
Clinical Rotations & Hands-on Training	Observation and hands-on experience with neuro-interventional procedures under expert supervision

Semester 2: Advanced Neurovascular Interventions and Research

Module	Topics Covered
Endovascular Treatment of Intracranial Aneurysms	Coiling, stent-assisted coiling, and flow diversion techniques for the management of cerebral aneurysms
Neurovascular Malformations and Tumors	Endovascular treatment of arteriovenous fistulas, vascular malformations, and brain tumors
Intracranial Stenosis and Carotid Artery Interventions	Endovascular stenting and angioplasty for intracranial stenosis and carotid artery disease
Spinal Interventions	Endovascular approaches to spinal arteriovenous malformations (AVMs) and spinal tumors
Ethical Considerations and Patient Safety	Radiation safety, patient care, and ethical considerations in neuro-interventional radiology
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Neurovascular Interventions	Mastery in performing endovascular procedures to treat strokes, aneurysms, AVMs, and intracranial stenosis.
2	Proficiency in Neuroimaging Techniques	Advanced knowledge of cerebral angiography, CT/MR angiography, and other neuroimaging modalities.
3	Competence in Acute Stroke Management	Expertise in the management of acute ischemic stroke using thrombectomy and other endovascular techniques.
4	Advanced Skills in Treating	Proficiency in treating cerebral aneurysms, AVMs, and

Sr. No.	Program Outcome	Description
	Neurovascular Malformations	brain tumors using endovascular approaches.
5	Patient Safety and Radiation Protection	Strong focus on radiation safety, patient care, and ethical standards during neuro-interventional procedures.
6	Contribution to Neuro Interventional Radiology Research	Engagement in research to advance the field and improve patient outcomes through innovative techniques.

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Endovascular Neurovascular Procedures	Ability to independently perform procedures such as thrombectomy, coiling, and stenting for neurovascular conditions.
2	Expertise in Neuroimaging for Interventions	Proficiency in interpreting advanced imaging modalities like cerebral angiography and MRI/CT angiography for guiding interventions.
3	Proficiency in Acute Stroke Management	Capability to perform thrombectomy and manage acute ischemic strokes using advanced neuro-interventional techniques.
4	Mastery in Treating Intracranial Aneurysms & AVMs	Ability to perform endovascular coiling, stent-assisted procedures, and flow diversion for aneurysms and AVMs.
5	Competence in Intracranial and Spinal Interventions	Expertise in managing intracranial stenosis, carotid artery disease, and spinal vascular malformations using endovascular techniques.
6	Research in Neuro Interventional Radiology	Ability to contribute to the field of neuro-interventional radiology through clinical research and evidence-based practices.

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10

Component	Credits
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Endovascular Neurovascular Procedures	Performing thrombectomy, coiling, and stenting for neurovascular conditions	50
Neuroimaging	Interpretation of cerebral angiography, CT/MR angiography for procedure planning	50
Intracranial Aneurysm & AVM Management	Performing endovascular procedures for aneurysms and AVMs	30
OSCE	Simulated clinical scenarios and skill demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on neuro-interventional treatment cases and clinical decisions	50
Recent Advances in Neuro IR	Discussion on the latest developments in neuro-interventional radiology	20
Ethical & Legal Aspects	Ethical considerations and patient care in neuro-interventional radiology	30

Research/Dissertation Submission:

Component	Marks

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Interventional Neuroradiology: A Practical Approach – R. F. D'Esterre
- Neuro Interventional Radiology – Michael J. Lev
- Endovascular Surgery: Principles and Techniques in Neurovascular Disorders – Christopher J. Moran
- Practical Neurointervention: A Guide to Interventional Neuroradiology – Frank R. Arata

Journals & E-Resources:

- Journal of NeuroInterventional Surgery – https://jneurointerv.com/
- Stroke: Journal of the American Heart Association – https://www.ahajournals.org/journal/str
- NeuroInterventional Surgery Society – https://www.snir.org/
- American Society of Neuroradiology – https://www.asnr.org/

Fellowship in Abdominal Interventional Radiology

Course Overview
The Fellowship in Abdominal Interventional Radiology is a one-year advanced training program designed for healthcare professionals specializing in the diagnosis and minimally invasive treatment of abdominal and pelvic conditions. The fellowship provides expertise in imaging techniques and therapeutic procedures, focusing on the management of liver diseases, gastrointestinal conditions, renal and urinary system disorders, and vascular conditions in the abdominal region. Fellows will gain hands-on experience in a range of procedures such as liver

biopsy, biliary interventions, transarterial embolization (TAE), transjugular intrahepatic portosystemic shunt (TIPS), and percutaneous drainage procedures.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology, Surgery, Gastroenterology, or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain proficiency in imaging techniques such as CT, MRI, and ultrasound for abdominal conditions.
- Learn and master interventional procedures for liver disease management, including liver biopsy, biliary interventions, and transjugular intrahepatic portosystemic shunt (TIPS).
- Develop expertise in managing gastrointestinal conditions through interventional procedures like gastrojejunostomy tube placement, esophageal variceal embolization, and transarterial embolization (TAE) for tumors.
- Master renal interventions, including percutaneous nephrostomy, renal biopsy, and interventions for obstructive uropathy.
- Understand the management of abdominal vascular conditions such as portal hypertension and the use of embolization techniques for treatment.
- Focus on patient care, ethics, and radiation safety in abdominal interventional radiology.
- Conduct research to explore and advance techniques in abdominal interventional radiology and improve patient outcomes.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Abdominal Interventional Radiology

Module	Topics Covered
Introduction to Abdominal Interventional Radiology	Overview of abdominal diseases and interventional radiology in abdominal conditions
Abdominal Imaging Techniques	Imaging modalities like CT, MRI, and ultrasound in

Module	Topics Covered
	abdominal radiology
Liver Diseases and Interventional Approaches	Diagnosis and management of liver diseases, including liver biopsy and TIPS procedure
Biliary Interventions	Techniques for managing biliary obstructions, stenting, and drainage procedures
Renal Interventions	Techniques in renal biopsy, percutaneous nephrostomy, and treatments for obstructive uropathy
Clinical Rotations & Hands-on Training	Observation and hands-on training in interventional procedures for abdominal conditions

Semester 2: Advanced Abdominal Interventions and Research

Module	Topics Covered
Gastrointestinal Interventions	Techniques for managing gastrointestinal tract conditions, including gastrojejunostomy tube placement and TAE for GI tumors
Vascular Interventions in Abdominal Diseases	Portal hypertension management, embolization techniques for tumors, and vascular access procedures
Pelvic Interventions	Interventions in the pelvic region, including uterine fibroid embolization and percutaneous drainage procedures
Ethical Considerations and Patient Safety	Radiation safety, patient care, and ethical standards in abdominal interventional radiology
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Mastery in Abdominal Interventional Procedures	Ability to perform a range of interventional procedures for the treatment of liver, gastrointestinal, and renal

Sr. No.	Program Outcome	Description
		conditions.
2	Proficiency in Abdominal Imaging Techniques	Advanced skills in imaging modalities such as CT, MRI, and ultrasound to guide interventions.
3	Expertise in Liver and Gastrointestinal Disease Management	Competence in the management of liver diseases and gastrointestinal disorders using interventional techniques.
4	Mastery in Renal and Abdominal Vascular Interventions	Proficiency in managing renal disorders, portal hypertension, and other abdominal vascular conditions through minimally invasive procedures.
5	Patient Safety and Ethical Considerations	Understanding and application of ethical principles, radiation safety, and patient care in abdominal interventional radiology.
6	Contribution to Abdominal IR Research	Engagement in research and clinical studies to improve techniques and outcomes in abdominal interventional radiology.

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Liver, Biliary, and Renal Interventions	Ability to perform liver biopsy, biliary interventions, TIPS procedures, and renal interventions.
2	Expertise in Gastrointestinal Interventions	Ability to conduct procedures like gastrojejunostomy tube placement, TAE, and variceal embolization.
3	Advanced Skills in Abdominal Vascular Interventions	Proficiency in portal hypertension management, vascular embolization techniques, and abdominal vascular access.
4	Mastery of Abdominal Imaging for IR Procedures	Ability to accurately interpret imaging studies for interventional procedures in abdominal radiology.
5	Competence in Abdominal Interventional Research	Contribution to advancing abdominal interventional radiology techniques and improving patient outcomes.

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Liver & Renal Procedures	Performing liver biopsy, TIPS procedure, and renal interventions	50
Biliary Interventions	Performing biliary stenting and drainage procedures	50
Gastrointestinal & Vascular Procedures	Performing procedures for gastrointestinal tract diseases and abdominal vascular conditions	30
OSCE	Simulated clinical scenarios and skill demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks

Component	Details	Marks
Case Presentations	Discussion on abdominal interventional procedures and treatment decisions	50
Recent Advances in Abdominal IR	Discussion on innovations and advancements in abdominal interventional radiology	20
Ethical & Legal Aspects	Ethical considerations and patient care in abdominal interventional radiology	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Interventional Radiology: A Comprehensive Approach – Peter S. Rothwell
- Abdominal Interventional Radiology – Geoffrey D. S. Marks
- Interventional Radiology: Techniques, Applications, and Limitations – William T. Friedman
- Interventional Radiology in Abdominal Diseases – Robert W. Maciel

Journals & E-Resources:

- Journal of Vascular and Interventional Radiology – https://www.jvir.org/
- Abdominal Imaging Journal – https://www.springer.com/journal/214
- Radiology: Cardiothoracic Imaging – https://pubs.rsna.org/journal/rcs

Fellowship in Cardiac Imaging

Course Overview

The Fellowship in Cardiac Imaging is a one-year advanced training program aimed at healthcare professionals who wish to specialize in the use of imaging techniques for diagnosing and managing cardiovascular diseases. The fellowship covers all aspects of cardiac imaging, including echocardiography, computed tomography (CT), magnetic resonance imaging (MRI), and nuclear medicine. Fellows will gain proficiency in the assessment of cardiac anatomy, function, and pathology, with an emphasis on integrating imaging findings into clinical decision-making. The program will also focus on the latest advancements in cardiac imaging technologies and research methodologies.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology, Cardiology, or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Master the different cardiac imaging modalities, including echocardiography, CT, MRI, and nuclear medicine.
- Gain expertise in diagnosing and managing cardiovascular conditions such as coronary artery disease, heart failure, congenital heart defects, and valvular heart disease.
- Learn to interpret cardiac imaging data and integrate it with clinical information to provide comprehensive patient care.
- Understand the principles of cardiac imaging in interventional cardiology, including pre- and post-procedure imaging.
- Develop skills in advanced imaging techniques such as 3D echocardiography, cardiac MRI, and CT angiography.
- Conduct research in cardiac imaging to explore emerging technologies and enhance diagnostic capabilities.
- Foster collaborative skills with multidisciplinary teams in the management of cardiovascular patients.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Cardiac Imaging

Module	Topics Covered
Introduction to Cardiac Imaging	Overview of cardiac imaging modalities, clinical applications, and ethics
Echocardiography	Basic and advanced techniques, Doppler echocardiography, 3D echocardiography
Cardiac CT Imaging	Principles of CT angiography, coronary artery disease, and myocardial perfusion imaging
Cardiac MRI	MRI techniques for cardiac imaging, myocardial tissue characterization, heart failure, and valvular heart disease
Nuclear Cardiology	Nuclear medicine techniques for assessing myocardial perfusion, viability, and function
Clinical Rotations & Hands-on Training	Practical experience in performing and interpreting echocardiograms, CT, MRI, and nuclear studies

Semester 2: Advanced Cardiac Imaging and Research

Module	Topics Covered
Advanced Echocardiography	Contrast echocardiography, stress echocardiography, and new technologies
Cardiac CT Angiography	Advanced techniques in coronary CT angiography, plaque characterization, and cardiac risk assessment
Cardiac MRI Applications	Use of cardiac MRI in congenital heart disease, ischemic heart disease, and post-surgical evaluations
Interventional Cardiac Imaging	Role of imaging in pre- and post-interventional cardiology, imaging for coronary artery bypass grafting (CABG), stenting, and valve replacement
Emerging Technologies in Cardiac Imaging	3D imaging, hybrid imaging techniques, and the future of cardiac imaging
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Cardiac Imaging Modalities	Proficiency in performing and interpreting echocardiography, CT, MRI, and nuclear cardiology studies.
2	Advanced Knowledge in Cardiac Pathologies	Ability to diagnose and manage cardiovascular conditions through advanced imaging techniques.
3	Integration of Imaging Data in Clinical Decision-Making	Ability to incorporate imaging findings with clinical information to guide patient management.
4	Competence in Pre- and Post-Interventional Imaging	Mastery in the role of imaging in the assessment and management of patients undergoing interventional cardiology procedures.
5	Proficiency in Advanced Imaging Technologies	Ability to utilize advanced imaging techniques such as 3D echocardiography, CT angiography, and cardiac MRI.
6	Contribution to Cardiac Imaging Research	Active involvement in research to advance cardiac imaging techniques and improve clinical outcomes.

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Echocardiography	Ability to perform and interpret standard and advanced echocardiographic studies, including Doppler and 3D echocardiography.
2	Proficiency in Cardiac CT Imaging	Ability to perform and interpret CT angiography and myocardial perfusion imaging.
3	Expertise in Cardiac MRI	Proficiency in performing and interpreting cardiac MRI, including tissue characterization and post-procedural imaging.
4	Nuclear Medicine in Cardiology	Ability to use nuclear cardiology for assessing myocardial perfusion, viability, and function.
5	Integration of Cardiac Imaging with Clinical Care	Ability to incorporate imaging findings into clinical decision-making and treatment planning.
6	Research in Cardiac Imaging	Conducting research in emerging cardiac imaging technologies and improving diagnostic capabilities.

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Echocardiography	Performing and interpreting echocardiograms, Doppler studies	50
Cardiac CT Imaging	Performing and interpreting CT angiography and myocardial perfusion imaging	50
Cardiac MRI	Performing and interpreting MRI for heart conditions	50
Nuclear Cardiology	Performing and interpreting nuclear cardiology studies	30
OSCE	Simulated clinical scenarios, skill demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on cardiac imaging studies and clinical decision-making	50
Recent Advances in Cardiac Imaging	Discussion on innovations and advancements in cardiac imaging	20
Ethical & Legal Aspects	Ethical considerations and patient care in cardiac	30

Component	Details	Marks
	imaging	

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Echocardiography: A Practical Guide for Performing and Interpreting – Catherine M. Otto
- Cardiac CT Imaging: Diagnosis of Cardiovascular Disease – L. V. Peter
- Cardiovascular Magnetic Resonance Imaging: Methods and Clinical Applications – Mark A. Zabel
- Nuclear Cardiology: A Practical Approach – Patrick W. Serruys

Journals & E-Resources:

- Journal of Cardiovascular Magnetic Resonance – https://www.jcmr-online.com/
- European Heart Journal – Cardiovascular Imaging – https://academic.oup.com/ehjci
- Journal of the American Society of Echocardiography – https://www.asecho.org/
- Radiology: Cardiothoracic Imaging – https://pubs.rsna.org/journal/rcs

Fellowship in Neuro Imaging

Course Overview

The Fellowship in Neuro Imaging is a one-year advanced training program designed for healthcare professionals who wish to specialize in the use of imaging techniques to diagnose and manage neurological disorders. The fellowship will cover a broad range of neuroimaging modalities, including MRI, CT, PET, and functional imaging techniques. Fellows will gain proficiency in interpreting neuroimaging data, focusing on common neurological conditions such as stroke, epilepsy, tumors, neurodegenerative diseases, and trauma. This program integrates clinical experience with advanced imaging techniques and cutting-edge research in the field of neuroimaging.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology, Neurology, Neurosurgery, or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Master neuroimaging techniques, including MRI, CT, PET, functional MRI (fMRI), and diffusion tensor imaging (DTI).
- Gain expertise in diagnosing and managing neurological conditions, such as stroke, epilepsy, multiple sclerosis, brain tumors, and neurodegenerative diseases.
- Learn to interpret neuroimaging data and integrate it with clinical information for comprehensive patient management.
- Understand advanced imaging techniques such as fMRI, MR spectroscopy, and PET scanning.
- Develop skills in using neuroimaging for surgical planning, particularly in brain tumor resections, epilepsy surgery, and deep brain stimulation.
- Conduct research in neuroimaging to explore new methodologies and enhance diagnostic capabilities.
- Foster collaborative skills by working with multidisciplinary teams in the management of complex neurological disorders.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Neuro Imaging

Module	Topics Covered
Introduction to Neuro Imaging	Overview of neuroimaging modalities, clinical applications, and ethical considerations
Basic Principles of MRI and CT in Neuroimaging	Basic MRI and CT principles, anatomy, and imaging protocols
Neurovascular Imaging	Stroke imaging, CT and MRI angiography, vessel imaging techniques
Neurodegenerative Diseases Imaging	MRI in Alzheimer's disease, Parkinson's disease, and multiple sclerosis
Tumor Imaging	Brain tumor classification, MRI and CT imaging techniques for tumors, radiologic-pathologic correlation
Functional Imaging	Functional MRI, MR spectroscopy, PET scanning, and their applications in neurology
Clinical Rotations & Hands-on Training	Practical experience in performing and interpreting brain MRI, CT, PET, and functional imaging studies

Semester 2: Advanced Neuro Imaging Techniques and Research

Module	Topics Covered
Advanced MRI Techniques	Diffusion Tensor Imaging (DTI), MR spectroscopy, advanced imaging protocols
Functional MRI and PET Scanning	Advanced techniques in functional MRI, brain mapping, and PET in neurology
Neurotrauma Imaging	Imaging in traumatic brain injury, post-traumatic changes, and long-term follow-up
Neuroimaging in Epilepsy	Pre-surgical imaging in epilepsy, ictal and interictal imaging
Neuroimaging for Surgical Planning	Brain tumor resection, epilepsy surgery, deep brain stimulation planning, and image-guided neurosurgery
Emerging Technologies in Neuro Imaging	New developments in imaging technologies, artificial intelligence in imaging
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Neuro Imaging Modalities	Mastery in MRI, CT, PET, functional MRI, and other neuroimaging techniques
2	Advanced Knowledge of Neurological Disorders	Ability to diagnose and manage neurological conditions with advanced imaging technologies
3	Proficiency in Functional and Structural Imaging	Ability to use functional MRI, PET, and other advanced imaging modalities for evaluating brain function and structure
4	Surgical Planning with Neuro Imaging	Ability to use neuroimaging for planning neurosurgery and interventions like deep brain stimulation
5	Research in Neuro Imaging	Conducting research in emerging neuroimaging techniques and advancing clinical practice
6	Integration of Neuro Imaging in Clinical Care	Ability to combine imaging findings with clinical data to provide comprehensive patient care

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in MRI and CT in Neuro Imaging	Ability to perform and interpret standard MRI and CT neuroimaging studies, including advanced protocols
2	Proficiency in Functional Imaging	Advanced understanding of functional MRI and PET techniques for brain mapping and functional assessment
3	Expertise in Neurovascular Imaging	Ability to evaluate stroke, hemorrhage, and other neurovascular conditions with CT angiography and MRI
4	Expertise in Tumor Imaging	Ability to diagnose and manage brain tumors using MRI, CT, and other neuroimaging techniques
5	Neuroimaging in Surgical Planning	Ability to utilize imaging for surgical planning, including brain tumor resections, epilepsy surgery, and deep brain stimulation
6	Competence in Neuro Imaging Research	Conduct research that contributes to the advancement of neuroimaging technology and its clinical applications

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
MRI	Performing and interpreting brain MRIs with advanced techniques	50
CT	Performing and interpreting brain CT scans, including angiography	50
Functional Imaging	Interpreting fMRI, MR spectroscopy, and PET scans	50
Neurovascular Imaging	Performing and interpreting CT and MRI angiography for stroke and vascular conditions	30
OSCE	Simulated clinical scenarios, skill demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on neuroimaging studies and clinical decision-making	50
Recent Advances in Neuro Imaging	Discussion on innovations and advancements in neuroimaging	20
Ethical & Legal Aspects	Ethical considerations and patient care in neuroimaging	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Neuroimaging: A Clinical Approach – David L. Brown
- Functional MRI: An Introduction to Methods – Peter Jezzard, Richard B. Buxton, and Richard Turner
- Neuroimaging in Neurodegenerative Disease – Oscar L. Lopez
- Magnetic Resonance Imaging in Stroke – Ali R. R. Jahanian

Journals & E-Resources:

- NeuroImage – https://www.journals.elsevier.com/neuroimage
- Journal of Neurosurgery – https://thejns.org/
- Journal of Magnetic Resonance Imaging – https://onlinelibrary.wiley.com/journal/15222586

Fellowship in Abdominal Imaging (GI & GU)

Course Overview

The Fellowship in Abdominal Imaging (GI & GU) is a one-year advanced program designed for radiologists and medical professionals specializing in abdominal imaging, with a focus on gastrointestinal (GI) and genitourinary (GU) systems. The fellowship aims to provide comprehensive training in the latest imaging techniques used for diagnosing and managing diseases affecting the GI and GU systems, including CT, MRI, ultrasound, and fluoroscopy. Fellows will gain expertise in both the imaging of common conditions such as colorectal cancer, liver diseases, and urological disorders, as well as rare and complex diseases. This fellowship will include both clinical experience and research opportunities to advance imaging methodologies.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain proficiency in interpreting and performing abdominal imaging techniques, including CT, MRI, ultrasound, and fluoroscopy for both GI and GU systems.
- Learn to diagnose common and complex conditions in the GI and GU systems, such as liver cirrhosis, colorectal cancer, nephrolithiasis, and urological cancers.
- Understand the role of imaging in the management and monitoring of chronic diseases of the GI and GU systems.
- Develop expertise in advanced imaging modalities such as CT/MRI enterography, virtual colonoscopy, and contrast-enhanced ultrasound.
- Improve skills in performing image-guided interventions such as biopsy and drainage in GI and GU systems.
- Conduct research in abdominal imaging to explore new imaging techniques and enhance diagnostic capabilities.
- Integrate imaging findings with clinical information for better decision-making in patient management.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Abdominal Imaging (GI & GU)

Module	Topics Covered
Introduction to Abdominal Imaging	Overview of abdominal imaging modalities and ethical considerations in GI and GU imaging
Basic Principles of Abdominal CT & MRI	Techniques for imaging the abdominal organs, including protocols, anatomy, and standard practices
Gastrointestinal Imaging	Imaging of the GI system, including the esophagus, stomach, intestines, liver, pancreas, and colon; CT, MRI, and ultrasound applications
Genitourinary Imaging	Imaging of the kidneys, bladder, ureters, and prostate; CT, MRI, and ultrasound for GU pathology
Advanced Ultrasound in GI & GU Imaging	Use of ultrasound for imaging GI and GU disorders, including Doppler techniques
Imaging in Abdominal Trauma	Trauma-related imaging protocols for GI and GU systems
Clinical Rotations & Hands-on Training	Practical experience in performing and interpreting abdominal imaging studies for GI and GU conditions

Semester 2: Advanced Abdominal Imaging Techniques and Research

Module	Topics Covered
Advanced CT & MRI Techniques	CT/MRI enterography, virtual colonoscopy, liver MRI, and advanced contrast imaging
Imaging of GI Malignancies	Colorectal, esophageal, pancreatic, liver, and gastric cancers, including staging and post-surgical imaging
Imaging of GU Malignancies	Urological cancers, including renal cell carcinoma, bladder cancer, and prostate cancer
Functional Imaging in GI & GU	Functional imaging methods such as MRI elastography for liver diseases and dynamic contrast-enhanced imaging
Image-Guided Interventions in GI & GU Imaging	Percutaneous biopsy, drainage procedures, and image-guided catheter placements
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Abdominal Imaging Modalities	Mastery in using CT, MRI, ultrasound, and fluoroscopy for GI and GU imaging
2	Advanced Knowledge of GI & GU Diseases	Ability to diagnose and manage GI and GU disorders using advanced imaging techniques
3	Proficiency in Functional Imaging	Expertise in advanced imaging techniques for functional assessment, including MRI elastography and dynamic imaging
4	Mastery in Abdominal Interventions	Ability to perform image-guided interventions, including biopsy and drainage, in the GI and GU systems
5	Abdominal Imaging Research	Conduct research to advance imaging methodologies and contribute to the field of abdominal radiology
6	Integration of Imaging and Clinical Care	Ability to combine imaging results with clinical findings for comprehensive patient management

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in CT & MRI for GI and GU Imaging	Ability to perform and interpret advanced CT and MRI scans for GI and GU systems
2	Expertise in GI Malignancy Imaging	Ability to diagnose and stage gastrointestinal malignancies using advanced imaging techniques
3	Expertise in GU Malignancy Imaging	Ability to diagnose and manage urological cancers through CT, MRI, and ultrasound
4	Proficiency in Abdominal Ultrasound	Ability to use ultrasound techniques to evaluate both GI and GU conditions
5	Competence in Image-Guided Abdominal Interventions	Proficiency in performing image-guided interventions for abdominal conditions, including biopsies and drainage procedures
6	Advanced Research in Abdominal Imaging	Ability to conduct and present research in abdominal imaging to improve clinical practice

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
CT & MRI Imaging	Performing and interpreting CT and MRI abdominal scans for GI and GU conditions	50
Ultrasound	Performing and interpreting abdominal ultrasound for GI and GU conditions	50
Image-Guided Interventions	Conducting image-guided procedures such as biopsies and drainage	50
OSCE	Simulated clinical scenarios, skill demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on abdominal imaging cases and clinical decision-making	50
Recent Advances in Abdominal Imaging	Discussion on innovations in abdominal imaging techniques	20
Ethical & Legal Aspects in Abdominal Imaging	Ethical considerations and patient care in abdominal imaging practices	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Abdominal Imaging – David L. Birnbaum, C. R. L. Clark
- Gastrointestinal Imaging: The Requisites – Ronald L. Eisenberg
- Genitourinary Imaging: The Requisites – Peter H. Reynolds, Richard E. Clark
- CT and MRI of the Abdomen and Pelvis – Peter A. R. DeNardo

Journals & E-Resources:

- Abdominal Radiology – https://www.springer.com/journal/268
- Journal of Gastrointestinal and Abdominal Imaging – https://journals.sagepub.com/home/jga
- Radiology – https://pubs.rsna.org/journal/radiology

Fellowship in Cross-Sectional Imaging

Course Overview

The Fellowship in Cross-Sectional Imaging is a one-year advanced program designed for radiologists and healthcare professionals specializing in imaging techniques that allow for detailed internal views of the body, particularly through CT (computed tomography) and MRI (magnetic resonance imaging). The fellowship provides comprehensive training in cross-sectional imaging modalities, focusing on the interpretation of images, the clinical application of CT and MRI, and the latest advances in imaging technologies. Fellows will gain in-depth knowledge of cross-sectional imaging of various body systems, including the brain, chest, abdomen, pelvis, and musculoskeletal systems. They will also acquire hands-on experience in performing and interpreting high-quality cross-sectional images, utilizing the latest imaging protocols and techniques.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain proficiency in performing and interpreting cross-sectional imaging techniques, including CT and MRI, across various body systems.
- Understand the principles, protocols, and applications of CT and MRI in diagnosing a wide range of diseases and conditions.
- Learn advanced imaging techniques, including contrast-enhanced imaging, MRI spectroscopy, functional MRI, and dual-energy CT.
- Develop skills in cross-sectional imaging of specific areas, including the brain, chest, abdomen, pelvis, and musculoskeletal systems.
- Enhance the ability to use advanced technologies such as 3D imaging and multi-planar reformatting in cross-sectional studies.
- Gain expertise in interpreting and diagnosing complex cases using cross-sectional imaging, contributing to improved patient care and management.
- Conduct research on the latest trends in cross-sectional imaging and explore new methodologies to advance diagnostic accuracy and clinical practice.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Cross-Sectional Imaging

Module	Topics Covered
Introduction to Cross-Sectional Imaging	Overview of CT and MRI technologies, imaging principles, and protocols for different body systems
CT Imaging Principles	Basics of CT technology, radiation safety, image reconstruction, and optimization techniques
MRI Imaging Principles	MRI technology fundamentals, magnetic resonance physics, imaging sequences, and artifacts
Cross-Sectional Imaging of the Brain	MRI and CT imaging techniques for brain pathologies such as stroke, tumors, and neurodegenerative diseases
Cross-Sectional Imaging of the Chest	CT and MRI protocols for imaging pulmonary diseases, cardiac imaging, and mediastinal pathologies
Cross-Sectional Imaging of the Abdomen and Pelvis	Techniques for imaging abdominal organs, including liver, pancreas, kidneys, and pelvic organs using CT and MRI
Clinical Rotations & Hands-on Training	Observation and hands-on experience in performing CT and MRI scans of various body systems

Semester 2: Advanced Cross-Sectional Imaging and Research

Module	Topics Covered
Advanced CT Imaging	Advanced CT protocols for cardiac imaging, multi-phase CT, and dual-energy CT for oncology and abdominal imaging
Advanced MRI Techniques	MRI spectroscopy, functional MRI, diffusion-weighted imaging, and dynamic contrast-enhanced imaging
Cross-Sectional Imaging of the Musculoskeletal System	CT and MRI imaging for musculoskeletal diseases, joint pathologies, and sports injuries
Imaging of Vascular Pathologies	Cross-sectional imaging for vascular conditions such as aneurysms, arterial diseases, and venous abnormalities
Oncology Imaging	Imaging of tumors using cross-sectional techniques, staging, and monitoring treatment response
Image-Guided Procedures	Introduction to image-guided biopsy, drainage procedures, and minimally invasive interventions using cross-sectional imaging
Research Project & Case Studies	Literature review, case study presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Cross-Sectional Imaging Modalities	Mastery in performing and interpreting CT and MRI across a range of body systems
2	Advanced Knowledge of Imaging Protocols	Ability to select appropriate imaging protocols and enhance image quality for various diagnostic challenges
3	Proficiency in Imaging Complex Pathologies	Ability to diagnose and manage complex conditions such as cancers, vascular disorders, and neurological diseases using cross-sectional imaging
4	Mastery in Advanced Imaging Techniques	Expertise in using advanced CT and MRI techniques, including 3D imaging, MRI spectroscopy, and functional imaging
5	Competence in Image-Guided Procedures	Proficiency in performing minimally invasive procedures, such as biopsies and drainage, guided by cross-sectional imaging
6	Research in Cross-Sectional Imaging	Ability to engage in research projects that contribute to the advancement of imaging technologies and diagnostic techniques

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in CT & MRI Imaging	Ability to perform and interpret CT and MRI scans across various organs and body systems
2	Expertise in Cross-Sectional Brain Imaging	Proficiency in diagnosing brain conditions such as strokes, tumors, and neurological disorders using CT and MRI
3	Advanced Imaging of Chest, Abdomen, and Pelvis	Ability to interpret CT and MRI images for chest, abdominal, and pelvic pathologies
4	Proficiency in Musculoskeletal Imaging	Ability to perform CT and MRI scans of bones, joints, and soft tissues for musculoskeletal disorders
5	Advanced Knowledge in Vascular Imaging	Proficiency in using CT and MRI for imaging vascular conditions such as aneurysms and arterial diseases
6	Competence in Image-Guided Procedures	Ability to perform image-guided interventions such as biopsies and drainages using cross-sectional imaging

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
CT Imaging	Performing and interpreting CT scans for brain, chest, abdomen, and musculoskeletal conditions	50
MRI Imaging	Performing and interpreting MRI scans for various body systems	50
Image-Guided Procedures	Conducting image-guided interventions using CT/MRI	50
OSCE	Simulated clinical scenarios and skill demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion of cases involving cross-sectional imaging and clinical decision-making	50
Recent Advances in Cross-Sectional Imaging	Discussion of innovations in CT and MRI technologies	20
Ethical & Legal Aspects in Cross-	Ethical considerations in radiological practices	30

Component	Details	Marks
Sectional Imaging		

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Cross-Sectional Imaging: A Practical Guide – N. K. Gupta, John P. Clark
- CT and MRI of the Abdomen and Pelvis – Peter A. R. DeNardo
- MRI of the Brain and Spine – Scott W. Atlas
- Radiology of the Chest – David S. P. Yang

Journals & E-Resources:

- Radiology – https://pubs.rsna.org/journal/radiology
- Journal of Computer Assisted Tomography – https://journals.lww.com/jcat
- European Journal of Radiology – https://www.journals.elsevier.com/european-journal-of-radiology
- American Journal of Roentgenology (AJR) – https://www.ajronline.org/

Fellowship in Breast Imaging (Women's)

Course Overview

The Fellowship in Breast Imaging is a one-year advanced program designed for radiologists and healthcare professionals who want to specialize in the diagnosis and management of breast diseases using advanced imaging techniques. The fellowship provides in-depth training in breast imaging modalities such as mammography, ultrasound, MRI, and biopsy techniques. It aims to equip fellows with the skills necessary for the early detection, accurate diagnosis, and treatment planning of various breast conditions, including breast cancer, benign lesions, and high-risk screening. Fellows will also gain expertise in multidisciplinary collaboration, patient care, and the latest technologies in breast imaging.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent medical degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain proficiency in performing and interpreting mammography, ultrasound, and MRI for breast imaging.
- Understand the role of breast imaging in screening, diagnosis, and staging of breast cancer and benign breast conditions.
- Learn advanced imaging techniques, such as contrast-enhanced mammography, 3D mammography (tomosynthesis), and breast MRI.
- Develop expertise in performing image-guided procedures, including biopsy techniques such as fine needle aspiration (FNA) and core needle biopsy.
- Acquire the ability to interpret complex breast imaging cases and provide clinical recommendations based on the findings.
- Enhance communication and collaboration skills in a multidisciplinary team for breast cancer management and patient care.
- Conduct research to explore new technologies and improve breast imaging practices.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Breast Imaging

Module	Topics Covered
Introduction to Breast Imaging	Overview of breast anatomy, physiology, and pathology; role of imaging in breast health
Mammography Basics	Techniques for performing and interpreting conventional mammography, digital mammography, and 3D mammography (tomosynthesis)
Breast Ultrasound	Role of ultrasound in breast imaging; techniques for evaluating benign and malignant lesions
Breast MRI	Principles of MRI in breast imaging; indications for breast MRI; advanced MRI protocols
Screening and Early Detection	Screening guidelines for breast cancer; role of imaging in early detection and prevention
Clinical Rotations & Hands-on Training	Observation and hands-on experience with mammography, ultrasound, and MRI procedures

Semester 2: Advanced Breast Imaging Techniques and Research

Module	Topics Covered
Advanced Imaging Techniques	Contrast-enhanced mammography, dynamic breast MRI, elastography, and molecular imaging
Breast Biopsy Techniques	Image-guided biopsy procedures (FNA, core needle biopsy, stereotactic biopsy); indications, techniques, and complications
Management of High-Risk Patients	Imaging protocols for high-risk patients, genetic counseling, and the role of imaging in managing familial and hereditary conditions
Breast Cancer Staging	Using breast imaging for staging of breast cancer, including lymph node evaluation and monitoring post-treatment recurrence
Multidisciplinary Approach	Collaboration with surgeons, oncologists, pathologists, and other healthcare professionals in breast cancer diagnosis and treatment
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Breast Imaging Modalities	Mastery in performing and interpreting mammography, ultrasound, and breast MRI
2	Proficiency in Breast Cancer Screening	Ability to apply appropriate imaging protocols for early detection of breast cancer
3	Competence in Image-Guided Procedures	Ability to perform and interpret image-guided biopsies, including FNA, core needle biopsies, and stereotactic biopsies
4	Advanced Knowledge of High-Risk Breast Conditions	Ability to use imaging techniques in high-risk patient management, including genetic predisposition and familial conditions
5	Collaboration in Multidisciplinary Teams	Ability to work with a multidisciplinary team to develop treatment plans and improve patient outcomes
6	Research in Breast Imaging	Conduct research to contribute to the field of breast imaging, exploring new methodologies and technologies

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Mammography, Ultrasound, and MRI	Ability to perform and interpret mammography, breast ultrasound, and MRI for accurate diagnosis
2	Proficiency in Breast Biopsy Techniques	Expertise in conducting image-guided breast biopsies such as FNA, core needle, and stereotactic biopsies
3	Advanced Knowledge of Screening and Staging	Ability to perform breast cancer screening and staging with mammography, ultrasound, and MRI
4	Expertise in Managing High-Risk Breast Patients	Ability to manage high-risk patients using advanced imaging techniques and protocols
5	Competence in Multidisciplinary Collaboration	Ability to contribute to multidisciplinary discussions and collaborate for the management of breast disease
6	Competence in Breast Imaging Research	Ability to engage in research to improve breast imaging protocols, technologies, and patient outcomes

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Mammography	Techniques for performing mammography and diagnosing breast lesions	50
Ultrasound & MRI	Performing and interpreting ultrasound and MRI of the breast	50
Breast Biopsy Techniques	Performing image-guided biopsies, including FNA and core needle biopsy	50
OSCE	Simulated clinical scenarios and skill demonstrations	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion of breast imaging cases and clinical decision-making	50
Recent Advances in Breast Imaging	Journal article discussion on new technologies and techniques in breast imaging	20
Ethical & Legal Aspects in Breast Imaging	Ethical and legal considerations in breast imaging and patient care	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Breast Imaging: The Requisites – Debra M. Ikeda, Deborah S. H. W.
- Breast Cancer: A Guide to Clinical Management – Michael D. Stubblefield
- Diagnostic Imaging: Breast – Anne M. K. Warfield, David C. Levin
- Breast MRI – David R. S. Glover, Wilma L. V. Petersen

Journals & E-Resources:

- Radiology – https://pubs.rsna.org/journal/radiology
- The Breast Journal – https://onlinelibrary.wiley.com/journal/15244733
- Journal of Clinical Breast Cancer – https://journals.sagepub.com/home/bcc
- American Journal of Roentgenology (AJR) – https://www.ajronline.org/

Fellowship in Nuclear Medicine

Course Overview

The Fellowship in Nuclear Medicine is a one-year advanced program designed for healthcare professionals aiming to specialize in the use of radioactive substances for diagnostic imaging and therapy. The fellowship offers comprehensive training in various nuclear medicine techniques, including positron emission tomography (PET), single-photon emission computed tomography (SPECT), and molecular imaging. Fellows will gain expertise in the application of nuclear medicine in the diagnosis, staging, and treatment of various conditions, including cancer, cardiovascular diseases, and neurological disorders. The course emphasizes the integration of nuclear medicine with other imaging modalities, patient care, radiation safety, and research in advancing the field.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology, Medicine, or equivalent degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Master the principles and applications of nuclear medicine, including molecular imaging techniques like PET and SPECT.
- Gain expertise in diagnostic nuclear imaging for oncology, cardiology, neurology, and other specialties.
- Understand radiopharmaceuticals, their role in imaging, and their therapeutic uses.
- Learn radiation safety protocols and the clinical management of radioactive materials.
- Develop proficiency in interpreting nuclear medicine scans and integrating them with other imaging modalities for a comprehensive diagnosis.
- Enhance skills in performing and interpreting hybrid imaging techniques such as PET/CT and SPECT/CT.
- Conduct research in nuclear medicine to explore new radiopharmaceuticals, imaging techniques, and therapeutic applications.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Nuclear Medicine

Module	Topics Covered
Introduction to Nuclear Medicine	History, principles, and applications of nuclear medicine; role in diagnosis and therapy
Radiopharmaceuticals	Types of radiopharmaceuticals, preparation, administration, and their clinical uses
Basic Imaging Techniques	Fundamentals of PET, SPECT, and gamma cameras; imaging principles and protocols
Radiation Safety	Radiation protection, regulatory standards, and safety measures for patients and healthcare providers
Nuclear Medicine in Oncology	Role of nuclear medicine in the diagnosis, staging, and monitoring of cancers (e.g., PET/CT for cancer detection)
Clinical Rotations & Hands-on Training	Observation and hands-on experience in performing nuclear medicine scans, administering radiopharmaceuticals, and interpreting results

Semester 2: Advanced Nuclear Medicine Techniques and Research

Module	Topics Covered
PET and SPECT Imaging	Advanced techniques in PET and SPECT; application in oncology, cardiology, and neurology
Hybrid Imaging (PET/CT, SPECT/CT)	Integration of PET or SPECT with CT scans for improved diagnostic accuracy
Nuclear Cardiology	Cardiac imaging techniques using nuclear medicine, including myocardial perfusion imaging (MPI)
Neuroimaging in Nuclear Medicine	PET and SPECT applications in diagnosing and managing neurological disorders (e.g., Alzheimer's, epilepsy, Parkinson's)
Therapeutic Nuclear Medicine	Radiotherapy techniques, including radioiodine therapy for thyroid diseases and other radionuclide therapies
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Nuclear Medicine Imaging	Mastery in performing and interpreting PET, SPECT, and gamma camera scans for various conditions
2	Proficiency in Radiopharmaceuticals	In-depth knowledge of radiopharmaceuticals, their preparation, administration, and therapeutic applications
3	Advanced Skills in Hybrid Imaging	Ability to perform and interpret hybrid imaging techniques such as PET/CT and SPECT/CT for improved diagnosis
4	Competence in Radiation Safety	Ability to implement radiation protection and safety protocols in clinical practice
5	Knowledge in Nuclear Medicine Therapy	Expertise in using nuclear medicine for therapeutic purposes, including radioiodine therapy
6	Contribution to Nuclear Medicine Research	Conduct research in nuclear medicine to enhance diagnostic and therapeutic techniques

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Nuclear Medicine Techniques	Proficiency in performing and interpreting PET, SPECT, and gamma camera scans for accurate diagnosis
2	Expertise in Radiopharmaceutical Applications	Understanding of the preparation, administration, and use of radiopharmaceuticals in diagnostics and therapy
3	Advanced Knowledge in Hybrid Imaging	Ability to use hybrid imaging (PET/CT, SPECT/CT) for integrated diagnosis and treatment planning
4	Proficiency in Nuclear Cardiology and Neurology Imaging	Ability to apply nuclear medicine techniques to diagnose and manage cardiac and neurological conditions
5	Competence in Therapeutic Nuclear Medicine	Ability to perform and manage radiotherapy treatments, such as radioiodine therapy
6	Research in Nuclear Medicine	Ability to conduct research that contributes to the development of new imaging technologies and therapeutic approaches in nuclear medicine

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Nuclear Medicine Imaging	Performing and interpreting PET, SPECT, and gamma camera scans	50
Radiopharmaceuticals	Understanding preparation and administration of radiopharmaceuticals	50
Hybrid Imaging (PET/CT, SPECT/CT)	Performing and interpreting hybrid imaging scans	50
OSCE	Simulated clinical scenarios, skill demonstration	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Presentation and discussion of clinical nuclear medicine cases	50
Recent Advances in Nuclear Medicine	Journal article discussion on new technologies and techniques	20

Component	Details	Marks
Ethical & Legal Aspects in Nuclear Medicine	Ethical considerations in radiopharmaceutical use and patient care	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Nuclear Medicine: A Practical Approach – S. R. Subramanian
- Nuclear Medicine: Diagnostic and Therapeutic Applications – Thomas E. S.
- Practical Nuclear Medicine – P. D. Stoll
- Molecular Imaging in Biology and Medicine – Gary J. Welch, Michael J. Phelps

Journals & E-Resources:

- Journal of Nuclear Medicine – https://jnm.snmjournals.org/
- Nuclear Medicine and Biology – https://www.journals.elsevier.com/nuclear-medicine-and-biology
- European Journal of Nuclear Medicine and Molecular Imaging – https://www.springer.com/journal/120
- Radiology – https://pubs.rsna.org/journal/radiology

Fellowship in Onco-Radiology

Course Overview

The Fellowship in Onco-Radiology is a one-year advanced program tailored for radiologists and healthcare professionals interested in specializing in the radiologic aspects of oncology. This fellowship offers in-depth training in the use of imaging techniques to diagnose, stage, and monitor cancer, with a focus on advanced imaging modalities, including CT, MRI, PET/CT, and interventional radiology. Fellows will gain expertise in imaging-guided biopsies, radiation therapy planning, and assessing treatment response, ensuring a holistic approach to cancer care through imaging.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology, Medicine, or equivalent degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Master the principles of imaging modalities in oncological practice, including CT, MRI, and PET/CT.
- Gain expertise in using advanced imaging techniques for cancer detection, staging, and treatment monitoring.
- Develop skills in interpreting imaging studies for various cancers, including solid tumors and hematologic malignancies.
- Learn imaging-guided procedures, including biopsies, drainage, and other interventional radiology techniques in oncology.
- Understand the role of imaging in radiation therapy planning and follow-up.
- Develop proficiency in assessing treatment response, detecting recurrence, and evaluating metastatic spread.
- Contribute to research in oncological imaging to advance technology and improve patient care.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Onco-Radiology

Module	Topics Covered
Introduction to Onco-Radiology	Overview of oncology and radiology's role in cancer diagnosis, staging, and treatment
Imaging Modalities in Oncology	CT, MRI, PET/CT principles, techniques, and protocols specific to cancer imaging
Radiologic Anatomy in Cancer	Detailed understanding of the anatomic features important for cancer diagnosis and staging
Oncology Basics	Understanding the biology of cancer, including tumor biology, classification, and spread
Imaging in Solid Tumors	Imaging features of common solid tumors (e.g., breast, lung, liver, and prostate cancers)
Clinical Rotations & Hands-on Training	Observation and practice in performing oncological imaging, including biopsies and other imaging-guided procedures

Semester 2: Advanced Techniques in Onco-Radiology and Research

Module	Topics Covered
Advanced Imaging Techniques	Advanced CT, MRI, and PET/CT protocols, including functional imaging, diffusion MRI, and contrast agents in oncology
Interventional Onco-Radiology	Imaging-guided biopsies, ablation, drainage, and tumor embolization for cancer management
Radiation Therapy Planning	Role of imaging in treatment planning, dosimetry, and follow-up imaging for radiation therapy
Oncology in Pediatric Imaging	Imaging strategies and challenges specific to pediatric oncology
Metastasis Imaging	Imaging of metastatic spread, including lymph node, bone, and brain metastases
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Oncological Imaging	Mastery of imaging techniques like CT, MRI, and PET/CT for cancer diagnosis, staging, and follow-up
2	Advanced Skills in Interventional Onco-Radiology	Ability to perform imaging-guided interventions such as biopsies, tumor ablation, and drainage
3	Competence in Radiation Therapy Planning	Proficiency in using imaging for radiation therapy planning and assessing treatment response
4	Expertise in Cancer Diagnosis and Staging	Advanced knowledge in the diagnostic criteria, staging systems, and tumor-specific imaging features
5	Research in Onco-Radiology	Ability to conduct and contribute to research on advancements in oncological imaging
6	Comprehensive Patient Care in Oncology	Understanding the role of imaging in multidisciplinary oncology care, including monitoring treatment efficacy and detecting recurrence

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Oncological Imaging Techniques	Ability to perform and interpret advanced imaging for the diagnosis, staging, and follow-up of cancer
2	Expertise in Interventional Radiology for Oncology	Proficiency in performing interventional procedures in oncology, such as biopsies and image-guided ablations
3	Knowledge in Radiation Therapy Planning	Ability to contribute to radiation therapy planning through detailed and precise imaging
4	Proficiency in Imaging for Metastatic Disease	Mastery in imaging metastatic spread, including nodal, osseous, and visceral metastases
5	Competence in Pediatric Onco-Radiology	Expertise in pediatric cancer imaging techniques and protocols for this specific population
6	Contribution to Onco-Radiology Research	Conducting research that enhances the field of oncological imaging and improves clinical outcomes

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Oncological Imaging	Performing and interpreting CT, MRI, and PET/CT scans for cancer diagnosis and staging	50
Interventional Radiology	Performing biopsies, tumor ablation, and drainage guided by imaging	50
Radiation Therapy Imaging	Demonstrating proficiency in using imaging for radiation therapy planning	50
OSCE	Simulated clinical scenarios, skill demonstration	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on oncology imaging cases, clinical decisions, and treatment planning	50
Recent Advances in Onco-Radiology	Discussion on advancements in imaging techniques in oncology	20
Ethical & Legal Aspects in Onco-Radiology	Ethical issues and patient care considerations in oncological imaging	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Onco-Radiology: A Comprehensive Guide – David S. H.
- Diagnostic Imaging: Oncology – David J. Vining
- Cancer Imaging: A Practical Approach – Daniel B. Fajardo
- Radiology in Oncology: From Diagnosis to Treatment – S. A. O'Connor, G. M. Kumar

Journals & E-Resources:

- Journal of Clinical Oncology – https://ascopubs.org/journal/jco
- Radiology – https://pubs.rsna.org/journal/radiology
- Journal of Oncological Imaging – https://www.journals.elsevier.com/journal-of-oncological-imaging

Fellowship in Musculoskeletal Imaging

Course Overview

The Fellowship in Musculoskeletal Imaging is a one-year advanced program designed for radiologists and healthcare professionals who wish to specialize in the imaging of musculoskeletal disorders. This fellowship provides comprehensive training in the diagnostic use of advanced imaging modalities, including MRI, CT, ultrasound, and X-rays, for musculoskeletal diseases. Fellows will acquire expertise in imaging techniques used for diagnosing and managing musculoskeletal injuries, degenerative diseases, inflammatory conditions, and neoplastic diseases, as well as developing skills for performing image-guided musculoskeletal interventions.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain proficiency in advanced imaging techniques (MRI, CT, ultrasound, and X-ray) for musculoskeletal disorders.
- Understand the pathophysiology of musculoskeletal diseases, including trauma, degenerative, inflammatory, and neoplastic conditions.
- Learn the role of musculoskeletal imaging in the diagnosis, staging, and management of musculoskeletal diseases.
- Master image-guided interventions, such as joint injections, aspirations, and biopsies.
- Understand the application of imaging for surgical planning and post-operative assessments in musculoskeletal cases.
- Develop an understanding of sports injuries, their imaging diagnosis, and management.
- Contribute to research in musculoskeletal imaging to advance the field and improve clinical outcomes.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Musculoskeletal Imaging

Module	Topics Covered
Introduction to Musculoskeletal Imaging	Overview of musculoskeletal anatomy, imaging modalities, and their role in diagnosis
Basic Imaging Techniques	X-ray, CT, MRI, and ultrasound principles and protocols in musculoskeletal imaging
Normal Musculoskeletal Anatomy	Detailed understanding of bone, joint, and soft tissue anatomy as viewed on various imaging modalities
Trauma Imaging	Imaging of fractures, dislocations, and soft tissue injuries; assessment of musculoskeletal trauma
Degenerative Joint Diseases	Osteoarthritis, degenerative disc disease, and imaging of spinal and joint degeneration
Clinical Rotations & Hands-on Training	Observation and hands-on practice with musculoskeletal imaging procedures in a clinical setting

Semester 2: Advanced Musculoskeletal Imaging Techniques and Interventions

Module	Topics Covered
Sports Injuries Imaging	Imaging of common sports-related musculoskeletal injuries, including ligament tears, tendon injuries, and bone contusions
Imaging of Inflammatory Conditions	Rheumatoid arthritis, ankylosing spondylitis, gout, and other inflammatory joint diseases
Neoplastic Conditions	Imaging of benign and malignant bone and soft tissue tumors
Musculoskeletal Ultrasound	Advanced use of ultrasound for imaging of joints, muscles, tendons, and ligaments
Image-Guided Interventions	Techniques for joint injections, aspirations, and biopsies guided by imaging
Advanced MRI Techniques	MRI protocols for musculoskeletal conditions, including sequences, contrast agents, and imaging artifacts
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Musculoskeletal Imaging	Mastery in the use of X-ray, CT, MRI, ultrasound, and advanced imaging techniques for musculoskeletal disorders
2	Proficiency in Musculoskeletal Interventions	Ability to perform image-guided interventions, such as joint injections, aspirations, and biopsies
3	Advanced Understanding of Musculoskeletal Diseases	Expertise in diagnosing trauma, degenerative diseases, inflammatory conditions, and neoplasms
4	Competence in Sports Injuries Imaging	Ability to accurately diagnose and manage sports-related musculoskeletal injuries
5	Application of Imaging in Surgical Planning	Contribution to pre-operative planning and post-operative assessment through musculoskeletal imaging
6	Research in Musculoskeletal Imaging	Ability to contribute to research in musculoskeletal imaging, advancing the field through evidence-based practices

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Musculoskeletal Imaging Techniques	Proficiency in using advanced imaging modalities for diagnosing musculoskeletal diseases and disorders
2	Expertise in Image-Guided Musculoskeletal Interventions	Ability to perform joint injections, biopsies, and aspirations using imaging guidance
3	Advanced Knowledge in Trauma and Degenerative Diseases	Ability to identify and manage musculoskeletal trauma and degenerative conditions using imaging
4	Proficiency in Imaging Inflammatory and Neoplastic Conditions	Expertise in imaging inflammatory and neoplastic conditions in musculoskeletal tissues
5	Competence in Sports Medicine Imaging	Ability to diagnose sports injuries and develop management plans based on imaging findings
6	Contribution to Musculoskeletal Imaging Research	Ability to conduct and contribute to research, improving diagnostic techniques and patient outcomes

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Musculoskeletal Imaging	Performing and interpreting X-ray, CT, MRI, and ultrasound scans for musculoskeletal conditions	50
Image-Guided Procedures	Performing joint injections, aspirations, and biopsies under imaging guidance	50
Sports Injuries Imaging	Imaging and diagnosing sports-related injuries such as ligament tears and tendon injuries	50
OSCE	Simulated clinical scenarios, skill demonstration	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on musculoskeletal imaging cases, clinical decisions, and treatment planning	50
Recent Advances in Musculoskeletal Imaging	Discussion on the latest imaging techniques and their application in musculoskeletal disorders	20
Ethical & Legal Aspects in Musculoskeletal Imaging	Ethical considerations in imaging and interventions for musculoskeletal diseases	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Musculoskeletal Imaging: A Practical Approach – Donald Resnick, Mark J. Kransdorf
- Musculoskeletal MRI – David W. Stoller
- Fundamentals of Musculoskeletal Ultrasound – John H. C. G.
- Imaging of Musculoskeletal Disorders – Roger J. P.

Journals & E-Resources:

- European Radiology – https://www.springer.com/journal/341
- Journal of Musculoskeletal & Neuronal Interactions – https://www.ismni.org
- Radiology – https://pubs.rsna.org/journal/radiology
- Journal of Orthopedic Research – https://www.jorthopres.org

Fellowship in Head & Neck Imaging

Course Overview

The Fellowship in Head & Neck Imaging is a one-year advanced program designed for radiologists and healthcare professionals who wish to specialize in the imaging of the head and neck region. This fellowship provides in-depth training in the use of imaging modalities such as CT, MRI, ultrasound, and PET for diagnosing a wide range of conditions affecting the head and neck, including tumors, infections, inflammatory diseases, congenital abnormalities, and trauma. The program emphasizes both the technical and clinical aspects of imaging, equipping fellows with the knowledge to accurately diagnose and guide treatment in this complex anatomical area.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Gain proficiency in using advanced imaging techniques (CT, MRI, ultrasound, PET) for head and neck conditions.
- Understand the anatomy and pathology of the head and neck region and how it relates to imaging findings.
- Develop expertise in imaging for diagnosing head and neck tumors, including benign and malignant neoplasms.
- Master imaging protocols for the evaluation of head and neck trauma and inflammatory diseases.
- Learn to evaluate and diagnose congenital conditions of the head and neck using imaging.
- Understand the role of imaging in the planning and monitoring of surgical and radiation therapies.
- Contribute to research that advances the understanding and clinical application of head and neck imaging.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Head & Neck Imaging

Module	Topics Covered
Introduction to Head & Neck Imaging	Overview of head and neck anatomy, imaging techniques, and their clinical applications
Normal Head & Neck Anatomy	Detailed understanding of the head and neck structures as seen on CT, MRI, and ultrasound
Imaging of Head & Neck Neoplasms	Imaging techniques for diagnosing benign and malignant tumors, including cancers of the larynx, pharynx, thyroid, and salivary glands
Imaging of Head & Neck Trauma	CT and MRI techniques for evaluating head and neck trauma, including skull fractures and soft tissue injuries
Infections and Inflammatory Diseases	Imaging of common infections and inflammatory conditions such as sinusitis, abscesses, and lymphadenopathy
Clinical Rotations & Hands-on Training	Observation and hands-on practice with head and neck imaging procedures in a clinical setting

Semester 2: Advanced Head & Neck Imaging Techniques and Interventions

Module	Topics Covered
Advanced CT and MRI Techniques	Advanced imaging protocols for detailed head and neck evaluation, including contrast-enhanced imaging and MR angiography
Head & Neck Imaging in Oncological Surgery	Role of imaging in preoperative planning, staging, and post-operative assessment of head and neck cancers
Imaging of Congenital Head & Neck Anomalies	Techniques for diagnosing congenital disorders such as cleft lip/palate, vascular malformations, and congenital neck masses
PET/CT in Head & Neck Oncology	Role of PET/CT imaging in staging and monitoring treatment response in head and neck cancers
Head & Neck Ultrasound	Advanced use of ultrasound for evaluating thyroid, parotid glands, and neck lymph nodes
Image-Guided Interventions	Techniques for performing biopsies, fine needle aspirations, and injections guided by imaging
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Head & Neck Imaging	Mastery in the use of CT, MRI, ultrasound, and PET for diagnosing head and neck disorders
2	Proficiency in Imaging for Head & Neck Oncology	Ability to evaluate and monitor benign and malignant head and neck tumors using advanced imaging techniques
3	Advanced Knowledge of Head & Neck Trauma Imaging	Expertise in diagnosing and assessing trauma to the head and neck, including soft tissue and bone injuries
4	Competence in Imaging Inflammatory and Infectious Diseases	Ability to diagnose common infections and inflammatory diseases of the head and neck using imaging
5	Mastery of Congenital Anomalies Imaging	Expertise in diagnosing congenital anomalies of the head and neck using imaging modalities
6	Image-Guided Interventions	Ability to perform image-guided procedures, such as biopsies and injections, in the head and neck region
7	Contribution to Head & Neck Imaging Research	Ability to conduct and contribute to research, advancing the field of head and neck imaging

Course Outcomes

Sr. No.	Course Outcome	Description
1	Mastery in Advanced Imaging Techniques	Proficiency in using advanced CT, MRI, ultrasound, and PET imaging techniques for head and neck disorders
2	Expertise in Oncological Imaging	Ability to assess head and neck cancers, including staging, surgical planning, and post-treatment monitoring
3	Proficiency in Trauma Imaging	Ability to diagnose and manage trauma-related head and neck injuries using imaging
4	Expertise in Imaging Inflammatory and Infectious Conditions	Ability to identify and monitor inflammatory and infectious diseases of the head and neck
5	Mastery in Imaging Congenital Conditions	Ability to diagnose congenital head and neck conditions, such as cleft lip/palate and vascular malformations
6	Ability to Perform Image-Guided Procedures	Competence in performing procedures like biopsies and injections under imaging guidance

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Head & Neck Imaging	Performing and interpreting CT, MRI, and ultrasound for head and neck disorders	50
Oncological Imaging	Staging and monitoring head and neck cancers using advanced imaging techniques	50
Trauma Imaging	Diagnosing trauma-related injuries in the head and neck region	50
OSCE	Simulated clinical scenarios, skill demonstration	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on head and neck imaging cases and clinical decisions	50
Recent Advances in Head & Neck Imaging	Discussion on the latest imaging techniques and technologies in head and neck imaging	20
Ethical & Legal Aspects in Head & Neck Imaging	Ethical considerations and patient care in head and neck imaging practices	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Head and Neck Imaging – Peter M. Som, M.D., and Nancy M. Curtin
- Imaging of the Head and Neck – Ronald S. Weinstein
- MRI of the Head and Neck – Michael E. Moser
- Essentials of Head and Neck Imaging – David P. Naidich

Journals & E-Resources:

- Radiology – https://pubs.rsna.org/journal/radiology
- Journal of Head and Neck Imaging – https://journals.lww.com/jhn
- European Journal of Radiology – https://www.journals.elsevier.com/european-journal-of-radiology

Fellowship in Emergency & Trauma Radiology

Course Overview

The Fellowship in Emergency & Trauma Radiology is a one-year advanced program designed for radiologists and healthcare professionals seeking specialized training in the imaging of acute and trauma-related conditions. This fellowship focuses on the rapid, accurate interpretation of imaging studies, including CT, MRI, X-ray, and ultrasound, to diagnose and manage trauma, acute emergencies, and critical care scenarios. The course aims to equip fellows with the necessary skills to handle high-pressure situations, perform timely imaging evaluations, and collaborate effectively with clinical teams in trauma centers, emergency departments, and intensive care units.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Develop expertise in interpreting imaging studies for acute trauma and emergency cases.
- Master the use of CT, MRI, X-ray, and ultrasound in diagnosing various traumatic injuries, including fractures, internal bleeding, and organ damage.
- Learn to rapidly assess and triage trauma patients based on imaging findings.
- Gain proficiency in imaging for polytrauma, multi-organ injuries, and complex emergency conditions.
- Understand the protocols and techniques for imaging in the critical care setting, including ICU and emergency room scenarios.
- Enhance collaboration with emergency medicine teams to provide timely diagnostic support and guide treatment decisions.
- Conduct research on the evolving role of radiology in emergency and trauma care, advancing imaging protocols and patient outcomes.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Emergency & Trauma Radiology

Module	Topics Covered
Introduction to Emergency & Trauma Radiology	Overview of emergency radiology, imaging protocols, and workflow in trauma care
Trauma Imaging Basics	Understanding trauma mechanisms, imaging modalities, and initial evaluation of trauma patients
X-ray in Trauma	Use of X-ray for skeletal trauma, chest and abdominal trauma, and early assessment
CT in Trauma & Emergency Cases	Protocols for whole-body CT, head, spine, thoracic, abdominal, and pelvic imaging in trauma
MRI in Trauma	MRI indications and protocols for spinal cord injury, brain injuries, soft tissue injuries, and joint evaluation
Ultrasound in Emergency & Trauma Care	Use of ultrasound for trauma management, FAST (Focused Assessment with Sonography in Trauma) exams, and abdominal trauma
Clinical Rotations & Hands-on Training	Observation and hands-on practice with trauma radiology, including ER and trauma case evaluations

Semester 2: Advanced Imaging Techniques and Applications in Emergency Care

Module	Topics Covered
Polytrauma and Multi-Organ Injuries	Imaging in cases of polytrauma, complex fractures, and multi-organ injury assessment
Advanced CT in Emergency Radiology	Advanced CT protocols for rapid trauma assessment, including CTA (CT Angiography) for vascular injuries
MRI in Acute Emergencies	MRI techniques for evaluating acute neurological, musculoskeletal, and soft tissue trauma
Imaging in Head and Spine Trauma	Advanced imaging protocols for evaluating brain and spinal injuries, including trauma and hemorrhages
Abdominal Trauma Imaging	Imaging techniques for diagnosing abdominal trauma, including liver, spleen, and kidney injuries
Imaging in Critical Care and ICU	Imaging considerations and protocols for critically ill patients, including in the ICU and emergency department
Research Project & Case Studies	Literature review, clinical case presentations, and preparation of research dissertation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Trauma Radiology	Mastery of imaging modalities used to diagnose and manage acute trauma and emergency conditions
2	Advanced Knowledge in Imaging Techniques	Proficiency in advanced CT, MRI, X-ray, and ultrasound protocols for trauma and emergency cases
3	Ability to Handle Polytrauma Cases	Expertise in managing polytrauma and multi-organ injury cases using imaging tools
4	Competence in Critical Care Imaging	Knowledge of imaging procedures and protocols for critically ill and ICU patients
5	Effective Collaboration in Trauma Care	Ability to work efficiently in a multi-disciplinary trauma team, providing essential diagnostic support
6	Contribution to Emergency Radiology Research	Ability to conduct research, improving trauma imaging protocols and patient outcomes

Course Outcomes

Sr. No.	Course Outcome	Description
1	Proficiency in Trauma Imaging Modalities	Ability to accurately interpret CT, MRI, X-ray, and ultrasound images for trauma and emergency patients
2	Expertise in Emergency Trauma Management	Ability to triage and manage emergency trauma cases, providing rapid and accurate imaging diagnosis
3	Advanced Knowledge of Polytrauma & Multi-Organ Injury	Proficiency in handling complex trauma cases involving multiple organ systems
4	Mastery in Imaging of Acute Neurological & Musculoskeletal Trauma	Ability to assess and interpret brain, spine, and musculoskeletal injuries in acute settings
5	Expertise in Abdominal Trauma Imaging	Ability to use advanced imaging techniques to evaluate abdominal trauma cases, including organ injury
6	Competence in Critical Care Imaging in Emergency Settings	Ability to perform timely imaging in critically ill patients in the emergency room or ICU
7	Research in Trauma Radiology	Conduct research to improve imaging protocols, decision-making processes, and patient outcomes in trauma care

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Trauma Imaging	Interpretation of CT, MRI, X-ray, and ultrasound for trauma and emergency patients	50
Polytrauma Imaging	Evaluating polytrauma cases and multi-organ injuries using advanced imaging techniques	50
Emergency Imaging	Rapid interpretation of imaging in emergency situations, such as fractures, internal bleeding, and trauma	50
OSCE	Simulated clinical scenarios, skill demonstration in emergency radiology	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on emergency and trauma imaging cases and clinical decision-making	50
Recent Advances in Emergency Radiology	Journal article discussion on new imaging techniques and innovations in trauma care	20
Ethical & Legal Aspects in Emergency Imaging	Ethical considerations and patient care in trauma imaging practices	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Emergency Radiology: A Case-Based Approach – David P. Naidich, et al.
- Trauma Imaging: A Practical Guide – Christopher G. B. Clarke
- Essentials of Emergency Radiology – Richard H. Cohan
- Emergency and Trauma Radiology – Peter L. Ponsky

Journals & E-Resources:

- Radiology – https://pubs.rsna.org/journal/radiology
- Journal of Emergency Medicine – https://www.journals.elsevier.com/journal-of-emergency-medicine
- Emergency Radiology – https://www.springer.com/journal/10140

Fellowship in Pediatric Radiology

Course Overview

The Fellowship in Pediatric Radiology is a one-year advanced program designed for radiologists who want to specialize in the imaging of pediatric patients. This fellowship provides in-depth knowledge and hands-on experience in the unique imaging challenges of children, covering a wide range of pediatric conditions. Fellows will gain expertise in various imaging techniques including X-ray, ultrasound, CT, MRI, and fluoroscopy, with an emphasis on the differences in imaging for children compared to adults. The program also focuses on the specific needs of pediatric patients, including radiation safety, child-friendly imaging techniques, and early diagnosis of congenital and acquired conditions.

Prerequisites

Criteria	Details
Eligibility	MD in Radiology or equivalent degree
Duration	1 Year (Full-Time)
Mode of Study	Clinical, Theoretical, Hands-on Training
Assessment	Theory, Practical Exams, Clinical Logbook, Research Project

Course Objectives

- Develop expertise in the interpretation of pediatric radiographs, including common and complex pediatric conditions.
- Gain proficiency in using imaging modalities such as X-ray, ultrasound, CT, MRI, and fluoroscopy for pediatric patients.
- Understand the unique challenges of pediatric imaging, including radiation safety and pediatric imaging protocols.
- Learn to identify congenital, genetic, and developmental disorders using imaging techniques.
- Master advanced imaging techniques for pediatric conditions, including pediatric neuroimaging, musculoskeletal imaging, and abdominal imaging.
- Enhance knowledge in pediatric oncology, cardiology, and chest imaging.
- Conduct research to advance imaging techniques and protocols in pediatric radiology.

Curriculum with Semester-wise Syllabus & Modules

Semester 1: Fundamentals of Pediatric Radiology

Module	Topics Covered
Introduction to Pediatric Radiology	Overview of pediatric radiology, differences in imaging between children and adults, radiation safety
Pediatric Imaging Techniques	Imaging modalities in pediatrics: X-ray, ultrasound, CT, MRI, and fluoroscopy
Radiation Safety in Pediatrics	Radiation protection, ALARA (As Low As Reasonably Achievable) principles, pediatric radiation doses
Pediatric Chest Imaging	Imaging for pediatric respiratory conditions, including pneumonia, congenital anomalies, and asthma
Pediatric Musculoskeletal Imaging	Imaging techniques for pediatric fractures, bone tumors, and musculoskeletal conditions
Abdominal Imaging in Pediatrics	Techniques for diagnosing abdominal conditions such as appendicitis, intussusception, and gastrointestinal disorders
Clinical Rotations & Hands-on Training	Observations and practical experience in pediatric imaging, including radiographic techniques, ultrasound, and CT

Semester 2: Advanced Pediatric Radiology and Research

Module	Topics Covered
Neuroimaging in Pediatrics	Imaging the pediatric brain, CNS malformations, hydrocephalus, and brain tumors
Pediatric Cardiovascular Imaging	Imaging techniques for pediatric heart conditions, including congenital heart disease, cardiomyopathy, and cardiac anomalies
Pediatric Oncology Imaging	Imaging for childhood cancers, including leukemia, brain tumors, and bone tumors
Pediatric Imaging in Genetic & Metabolic Disorders	Imaging in conditions like cystic fibrosis, sickle cell anemia, and metabolic disorders
Pediatric Radiology in Urgent Care	Imaging in pediatric trauma and emergencies, such as fractures, head injuries, and abdominal trauma
Research Project & Case Studies	Literature review, clinical case presentations, research dissertation preparation

Program Outcomes

Sr. No.	Program Outcome	Description
1	Expertise in Pediatric Imaging	Master the interpretation of pediatric radiographs across all body systems, from chest and musculoskeletal to neuroimaging.
2	Advanced Knowledge of Pediatric Imaging Modalities	Gain proficiency in using X-ray, ultrasound, CT, MRI, and fluoroscopy tailored to the pediatric patient population.
3	Radiation Safety Expertise	Deep understanding of radiation safety principles, including appropriate imaging protocols for minimizing radiation exposure in children.
4	Proficiency in Pediatric Neuroimaging	Develop expertise in pediatric neuroimaging to diagnose conditions like brain malformations, epilepsy, and tumors.
5	Mastery in Pediatric Oncology Imaging	Expertise in imaging childhood cancers, with a focus on early detection and monitoring of treatment responses.
6	Competence in Pediatric Emergency Imaging	Ability to evaluate pediatric trauma and emergencies effectively with accurate and timely imaging.
7	Contribution to Pediatric Radiology Research	Engage in research to advance pediatric imaging protocols, safety measures, and diagnostic techniques.

Course Outcomes

Sr. No.	Course Outcome	Description
1	Proficiency in Pediatric Imaging	Ability to interpret pediatric imaging studies accurately, from skeletal, chest, abdominal, to neurological and oncological cases.
2	Expertise in Pediatric Radiology Techniques	Knowledge of pediatric-specific imaging protocols, including radiation dose management and child-friendly imaging approaches.
3	Mastery in Pediatric Neuroimaging	Proficiency in diagnosing and interpreting neuroimaging findings in pediatric neurology, including malformations and tumors.
4	Advanced Knowledge of Pediatric Oncology Imaging	Ability to evaluate childhood cancers, providing accurate assessments for treatment planning and monitoring.
5	Competence in Pediatric Trauma Imaging	Expertise in imaging for trauma in children, such as fractures, head trauma, and abdominal injuries.
6	Effective Research & Development in Pediatric Radiology	Ability to conduct research and contribute to the development of new pediatric radiology techniques and best practices.

Credits & Assessment Methods

Total Credits: 40

Component	Credits
Theory & Lectures	10
Clinical Rotations & Case Studies	10
Hands-on Training & Procedures	10
Research & Dissertation	10

Assessment Pattern

Assessment Type	Weightage
Theory Examination (MCQs, Long & Short Answer)	30%
Clinical & Practical Exam (Case-Based Discussion, OSCE)	30%
Clinical Logbook & Case Reports	20%
Research Presentation & Dissertation	20%

Exam Pattern
Theory Examination:
• Section A (MCQs – 30 Marks)
• Section B (Short Answer Questions – 30 Marks)
• Section C (Long Answer Questions – 40 Marks)

Practical Examination:

Component	Details	Marks
Pediatric Radiographs	Interpretation of pediatric X-rays, identifying common and complex pediatric conditions	50
Pediatric CT & MRI	Interpretation of pediatric CT and MRI scans for conditions like trauma, tumors, and congenital anomalies	50
Abdominal Imaging	Diagnosing pediatric abdominal conditions using ultrasound, X-ray, and CT	50
OSCE	Simulated clinical scenarios, skill demonstration in pediatric imaging	40

Viva Voce (Oral Examination):

Component	Details	Marks
Case Presentations	Discussion on pediatric imaging cases and clinical decision-making	50
Recent Advances in Pediatric Radiology	Journal article discussion on new imaging techniques and innovations in pediatric care	20
Ethical & Legal Aspects in Pediatric Radiology	Ethical considerations and child protection in pediatric imaging practices	30

Research/Dissertation Submission:

Component	Marks
Originality & Scientific Merit	30
Methodology & Data Analysis	30
Presentation & Discussion	20
Conclusion & Clinical Relevance	20

Final Weightage & Passing Criteria

Exam Component	Total Marks	Minimum Passing Marks
Theory	200	50% (100/200)
Practical Exam	200	50% (100/200)
Viva Voce	100	50% (50/100)
Dissertation	100	50% (50/100)
Total (Overall)	600	50% Aggregate Required

Recommended Books & E-Resources
Textbooks:

- Pediatric Radiology: The Requisites – Peter C. J. T. S. R. M.
- Diagnostic Imaging: Pediatric Radiology – Thomas L. Pope, et al.
- Pediatric Radiology: A Practical Approach – Jean C. L. V. S. B.
- Imaging of Pediatric Cranial & Spinal Disorders – D. H. McDonald

Journals & E-Resources:

- Pediatric Radiology – https://link.springer.com/journal/240
- Journal of Pediatric Radiology – https://journals.lww.com/jpedradiology
- Radiology – https://pubs.rsna.org/journal/radiology
- Pediatric Imaging – https://www.pediatricimaging.com/