CONCEPT

AI in Radiology and Digital Pathology: Evaluating and Deploying Medical Imaging AI

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Introduction:

AI in radiology and digital pathology is arriving in reading rooms and laboratories faster than departments can judge it: algorithms trained on one scanner fail on another, triage flags reshuffle worklists without clear ownership, and few products carry external validation evidence. This Core Concept course gives imaging and laboratory teams a no-code method to read performance evidence, test tools on local studies and slides, fit outputs into PACS and whole-slide viewer workflows and control automation bias. Participants produce an Imaging AI Evaluation Scorecard and a Departmental Pilot Protocol.

Course Objectives:

- Describe how DICOM studies, PACS archives and whole-slide images are structured, stored and exchanged, and identify the data an imaging AI tool needs
- Classify imaging AI products by task, including detection, segmentation, worklist triage and quantification, and match each to a departmental use case
- Evaluate vendor performance claims using sensitivity, specificity, ROC curves, AUC and external validation evidence on local case mixes
- Design reading-room and laboratory workflows that place AI outputs, flags and heatmaps where reporting staff can verify them and guard against automation bias
- Assess regulatory status, post-market monitoring, data governance and procurement terms for an imaging AI product before contract signature
- Produce an Imaging AI Evaluation Scorecard and Departmental Pilot Protocol with success measures and stop criteria

Target Audience:

- Radiology and pathology reporting staff responsible for signing off studies and slides reviewed with AI support
- Imaging and laboratory operations managers responsible for turnaround times, worklists and staffing
- PACS, RIS and imaging informatics staff responsible for integrating and supporting departmental AI applications
- Clinical governance and quality staff responsible for audit, incident review and safe adoption of new technology
- Procurement and contract staff responsible for sourcing imaging software and negotiating service terms

Course Outline:

Day 1: Imaging and Whole-Slide Data Foundations for AI

- Medical Imaging AI Landscape: Radiology and Digital Pathology Adoption Drivers
- DICOM Objects, Series Metadata and Modality Worklist Basics
- PACS and RIS Data Flow From Order to Signed Report
- Whole-Slide Imaging: Tile and Line Scanning, Z-Stacking and Multi-Resolution Pyramids
- Slide File Formats Compared: Proprietary Formats, DICOM WSI and OME-TIFF

Day 2: AI Task Types and Performance Evidence

- Detection, Segmentation, Classification and Quantification Task Taxonomy
- Radiology Use Cases: Chest Radiograph Triage, Mammography Screening Support and Dose Reduction
- Pathology Use Cases: Tumour Grading, Mitotic Figure Counting and Tissue Classification
- Confusion Matrix, Sensitivity, Specificity and Positive Predictive Value at Local Prevalence
- ROC Curve and AUC Interpretation With Operating Threshold Selection

Day 3: Local Validation and Workflow Integration

- External Validation Study Design Using a Retrospective Local Case Set
- Ground Truth Labelling Protocols and Inter-Reader Agreement Checks
- Worklist Prioritisation Rules and Critical Finding Escalation Paths
- AI Result Display: Overlays, Heatmaps and Structured Report Fields in the Viewer
- Integration Architecture Options: On-Premise, Cloud and AI Orchestration Platforms

Day 4: Bias, Human-AI Collaboration, Regulation and Governance

- Dataset Shift From Scanner Vendors, Staining Variation and Population Mix
- Automation Bias, Over-Reliance and Second-Reader Configuration Choices
- Regulatory Status Checks and Predetermined Change Control Plans at Overview
- Post-Market Performance Monitoring Dashboard and Drift Alert Thresholds
- Imaging Data Governance: De-Identification, Access Control and Secondary Use Agreements

Day 5: Case Studies, Procurement and Pilot Planning

- Radiology Case: Emergency Head CT Triage Tool Evidence Review
- Pathology Case: Prostate Biopsy Slide Analysis Tool Validation Critique
- Procurement Checklist: Licensing Models, Service Levels and Exit Terms
- Return on Investment Model: Reporting Time, Backlog and Scanner Utilisation Measures
- Imaging AI Evaluation Scorecard and Departmental Pilot Protocol Presentation

Skills You Will Gain:

- Imaging Data Literacy
- Diagnostic Accuracy Appraisal
- Local Validation Planning
- Reading Workflow Design
- Automation Bias Control
- Algorithm Performance Monitoring
- Imaging AI Procurement
- Pilot Protocol Design

Why Attend This Course:

- Return with an Imaging AI Evaluation Scorecard and Departmental Pilot Protocol built around a tool your department is considering
- Challenge vendor accuracy figures by recalculating predictive values at the prevalence your own department sees
- Agree who acts on AI triage flags before a tool changes the order of the worklist
- Compare radiology and pathology experience with peers from hospitals, diagnostic centres and reference laboratories

Conclusion:

Medical imaging AI helps a department only when the data, the evidence, the workflow and the monitoring are handled together. The course moves from DICOM, PACS and whole-slide image foundations through AI task types and accuracy metrics, to local validation, worklist integration and result display, then dataset shift, automation bias, regulatory status, post-market monitoring and governance. The final day applies this to radiology and pathology cases, procurement and return on investment, and produces a scorecard and pilot protocol ready for departmental review.