

Medical Imaging + Omics Integration (Radiogenomics) — Hands-on

Bridge medical imaging with genomics and transcriptomics to build decision-ready radiogenomic models. This hands-on module covers DICOM/PACS workflows, de-identification, segmentation best practices, IBSI-compliant radiomics feature extraction, harmonization across scanners, and multi-omics fusion with rigorous validation. Deliver clinician-ready summaries with interoperable reporting (FHIR/HL7) and governance.

Medical Imaging + Omics Integration (Radiogenomics)

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[Session 1](#)

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Imaging Foundations & DICOM

Modalities & data flow

[CT/MRI/PET · WSI \(overview\)](#) [DICOM basics & tags](#)
[PACS/DICOMweb](#)

Pre-processing & QA

[resampling/isotropic voxels](#) [bias field/normalization](#)

artifact checks

Privacy & de-identification

DICOM de-ID profiles **PHI checks** **linking to omics safely**

Session 2

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Segmentation & IBSI Radiomics

Segmentation approaches

3D Slicer / ITK-SNAP **nnU-Net / MONAI (overview)**
inter-/intra-rater checks

IBSI-compliant features

shape/1st-order **GLCM/GLRLM/GLSZM** **filter banks (LoG/wavelets)**

Harmonization & stability

ComBat/scanner effects **test-retest/ICC** **feature pruning**

Session 3

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Radiogenomics & ML Fusion

Linking features to omics

variant/RNA/protein signals **feature alignment & curation** **missing data strategies**

Modeling & validation

elastic net/XGBoost/SVM **nested CV/calibration**
ROC/PR/Brier/decision curves

Interpretability & drift checks

SHAP/feature ablation **subgroup robustness**
prospective monitoring

Session 4

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Reporting, FHIR/HL7 & Governance

Clinician-ready summaries

risk scores & cutoffs **limitations & disclaimers** **visual explainability**

Interoperability & IT

FHIR ImagingStudy/Observation **HL7, DICOMweb APIs**
EHR & PACS integration

Governance & deployment

privacy & de-ID SOPs **MLOps & change control** **audit trails & QA**