

# LM635 - MSc in Health Informatics

**Contact Course Director:**  
Dr Patrick Healy

Tel 353 (0) 61 202727

Email: [patrick.healy@ul.ie](mailto:patrick.healy@ul.ie)

Health informatics is a multi-disciplinary, multi-dimensional field. This field focuses on the creation, modelling, management and sharing of health data and knowledge to support data analysis and timely decision making in medicine and health care together with the information science and technology to support these tasks. It is not solely a technical discipline but focuses on the relationship between the technology and its use in real-world settings i.e. solutions are designed in context, taking into account the social, cultural and organisational settings in which computing and information technology will be used in health care sectors.

The M.Sc. in Health Informatics aims to equip graduates with the skills, knowledge and abilities to:

- Evaluate the opportunities and limitations of health care technology and of its impact in improving the efficiency, cost- effectiveness, safety and quality of health care delivery.
- Express user requirements for health care information systems.
- Integrate computing and managerial knowledge and experience with health-related knowledge and experience.
- Ensure compliance with the standards and regulations governing systems in this domain.
- Formulate, evaluate and apply evidence-based solutions in the delivery of health care.



Department of Computer Science and Information Systems

University of Limerick  
Limerick  
Ireland  
[www.csis.ul.ie](http://www.csis.ul.ie)

# MSc in Health Informatics

## Autumn

Module	Description
Health Informatics Applications	<ul style="list-style-type: none"> <li>- IOM quality characteristics of a health care delivery system</li> <li>- Classification of health care information systems;</li> <li>- Key benefits, features and functions of HCISs</li> <li>- Evolution of health information systems: functional perspective, technology perspective and architectural perspective</li> <li>- Introduction to systems engineering tools: systems design tools for meeting needs/desires of stakeholders</li> <li>- Introduction to health information system evaluation frameworks; evaluation aspects: technology, human and organisation</li> <li>- Evolution of health information systems: functional perspective, technology perspective and architectural perspective</li> <li>- Identify the hardware architecture, input/output devices, storage devices and communications and network architecture to support health care delivery</li> <li>- Document-specific technologies</li> <li>- Components of a health information system</li> <li>- Standards in health care</li> <li>- Signal, image and video compressions</li> <li>- How technologies and their methods of implementation effect usage and acceptance and affect users</li> <li>- Health care data standards: Health level 7 v3</li> </ul>
Electronic Health Record Management	<ul style="list-style-type: none"> <li>- Traditional Health Record Management (HRM) concepts and processes</li> <li>- Definition and scope of an Electronic Health Record Management (EHRM)</li> <li>- Definition, uses, benefits and impacts of an Electronic Health Record (EHR)</li> <li>- Workflow scenarios: comparison of the flow of information in paper versus electronic systems</li> <li>- Data flow, data sources, data uses, structured versus unstructured data</li> <li>- Type of information collected and stored</li> <li>- Lifecycle of an EHR; structure and content of an EHR.</li> <li>- EHR system types; features and functions of EHR systems</li> </ul>

	<ul style="list-style-type: none"> <li>- Standards system must meet to be considered a legal business record</li> <li>- EHR systems (regionally, provincially, territorially or nationally)</li> <li>- How an EHRM supports particular functionality</li> <li>- How an EHRM can support other care-related activities</li> <li>- Integrated-EHR systems; technical, semantic and process interoperability</li> <li>- Personally Controlled Health Records (PCHRs).</li> <li>- Differentiate between terminology, nomenclature and classification</li> <li>- Comparison of Standard Coding Systems such as ICD-10, SNOMED-CT, READ, Unified medical language systems (UMLS)</li> <li>- EHR regulatory and standards environment, data quality and completeness</li> <li>- Health Insurance Portability and Accountability Act (HIPAA): transactions and code sets</li> <li>- EHR data transport protocols; EHR data model standards.</li> <li>- Quality improvement and the EHR.</li> <li>- Legal considerations of an EHR: retention and durability</li> <li>- EHRM technology: enabling solutions, emerging trends.</li> </ul>
<p>Research Methods in Health Informatics</p>	<ul style="list-style-type: none"> <li>- Distinction between research and evaluation</li> <li>- The multidisciplinary nature of health research, health systems research and health services research</li> <li>- Ethics: data access, confidentiality and good practice, participant protection.</li> <li>- Responsibility for computer-based decisions.</li> <li>- Research paradigms: underlying assumptions of and basic beliefs</li> <li>- Evaluation design</li> <li>- Literature review</li> <li>- Data collection: checklists, questionnaires and surveys</li> <li>- Quantitative techniques: descriptive statistics, hypothesis testing</li> <li>- Qualitative methods: reason for choosing qualitative methods</li> <li>- Mixed-methods and mixed-models research: philosophical assumptions and methodological implications</li> <li>- Interpretation of results.</li> <li>- Presentation and dissemination of research findings.</li> <li>- Research management.</li> </ul>

<p>Medical Decision Support Systems</p>	<ul style="list-style-type: none"> <li>- Decision making; types of decisions.</li> <li>- Modelling decisions;</li> <li>- Decision support systems (DSSs)</li> <li>- Medical decision support systems (MDSSs): key functions of MDSSs</li> <li>- Range of components of a DSS</li> <li>- Role of MDSSs in reducing preventable medical errors</li> <li>- Construction of DSS tools; examples of MDSSs.</li> <li>- Normative and descriptive approaches</li> <li>- Linear programming: objective function, constraints, simplex solution, sensitivity analysis; network models and waiting line models; Bayesian networks; computer solutions; interpretation of results.</li> <li>- Decision making under conditions of risk and uncertainty.</li> <li>- Role of knowledge discovery techniques in decision support: discovery of decision models</li> <li>- User interfaces to MDSSs: support for model construction and analysis.</li> <li>- Expert systems in routine medical use: components</li> <li>- Trends concerning MDSSs</li> <li>- Security features: levels of data encryption, compliance with Health Insurance Portability and Accountability Act (HIPAA) requirements.</li> </ul>
<p>Requirements Engineering for Health Informatics</p>	<ul style="list-style-type: none"> <li>- The Requirements Process: Requirements in the Software Life Cycle</li> <li>- The elicitation and discovery of requirements: The sources of requirements</li> <li>- The analysis of requirements: Uses of modelling</li> <li>- Requirements documentation: Standards and templates</li> <li>- Requirements validation: Verification and validation of requirements</li> </ul>

# MSc in Health Informatics

Spring

Module	Description
Health Informatics Project Management	<ul style="list-style-type: none"> <li>- Using the best practices reported in the Project Management Body of Knowledge (PMBOK)</li> <li>- Application of best practices as specified by the Project Management Body of Knowledge with emphasis on the Project Management Institute (PMI) Health Care special interest group.</li> <li>- Project initiation, planning, executing, controlling and closing activities.</li> <li>- Governance of projects in health care settings (authorisation, change management, reporting etc.)</li> <li>- Project Management Offices in health care organisations.</li> <li>- Project scoping for different health care IS initiatives.</li> <li>- Project scheduling techniques.</li> <li>- Project cost management and control using earned value management.</li> <li>- Project Risk management - technology risks in the health care sector</li> <li>- Quality management of projects within health care.</li> <li>- Procurement planning and execution within the health sector.</li> <li>- Communications planning for health care projects - managing the diverse sets of stakeholders engaged in health care IT projects.</li> <li>- Staffing and general human resources management of IT projects in health care settings</li> <li>- Project management of outsourced IT projects.</li> <li>- Development of process assets for use in IT projects within health care settings.</li> <li>- Leadership and clinician engagement in HIT; Leadership as a driving force.</li> <li>- Engagement, empowerment and involvement of stakeholders.</li> <li>- Failing reasons for IT systems in general.</li> <li>- Putting all in IT perspectives and make IT systems development successful.</li> </ul>
Strategic Issues in Health Informatics	<ul style="list-style-type: none"> <li>- Exploring the evolution of information systems from transaction-based systems through management</li> </ul>

	<p>information systems and the current emphasis on strategic information systems.</p> <ul style="list-style-type: none"> <li>- Why information is now seen as a strategic asset for organisations in general.</li> <li>- Assess the strategic use of health care information systems.</li> <li>- Costs and benefits of information systems - hardware, software, personnel, maintenance.</li> <li>- Economics of information systems development versus acquisition</li> <li>- Acquisition strategies applied in health care settings.</li> <li>- Strategies for quality improvement.</li> <li>- Self-managing teams within health care settings.</li> <li>- Evaluation of Healthcare IT - Benefits/Value realisation.</li> <li>- Evaluation principles and tools.</li> <li>- Benefits and value definition.</li> <li>- Linkage of value to system development.</li> <li>- How IT can make evaluation easier.</li> <li>- Reviews the area of change management in the contest of IT implementations in health care settings.</li> <li>- Application of ERP systems to health care organisations.</li> <li>- Business Process Reengineering in health care settings.</li> <li>- The use of business intelligence systems to enable the timely collection and efficient reporting of key performance indicators that facilitate improvements in health care operations.</li> <li>- Incorporation of training to enable effective HIT deployment and use.</li> <li>- Adoption of IT to enable transformation of healthcare organisations.</li> <li>- Relationship of leadership, behaviour and technology domains.</li> </ul>
<p>E-Health Systems</p>	<ul style="list-style-type: none"> <li>- Health Information systems (ISs): development lifecycle; development paradigms.</li> <li>- Telehealth versus telemedicine</li> <li>- Drivers and barriers to e-health care</li> <li>- E-health strategies and impacts</li> <li>- E-health versus e-business and e-marketing.</li> <li>- Appreciation of design, implementation, testing and evaluation issues.</li> <li>- Software configuration, installation and maintenance.</li> <li>- Knowledge management for e-health: e-ontologies for health care, semantic web</li> <li>- Risks in applying e-technologies</li> </ul>

	<ul style="list-style-type: none"> <li>- E-networking: requirements, networking standards, signal, video and image compression and storage</li> <li>- E-security: frameworks for privacy and security: framework for security</li> <li>- E-health emerging trends.</li> </ul>
<p>ICT for Evidence-Based Health Care</p>	<ul style="list-style-type: none"> <li>- Scope and definition of Evidence-Based Medicine (EBM), Evidence-Based Practice (EBP) and Evidence-based Health Care (EBHC)</li> <li>- Health Services Research (HSR); HSR defined</li> <li>- Studies: cohort studies, case-control studies, randomized controlled trials</li> <li>- Formulating answerable questions</li> <li>- Finding the evidence: searching the literature, primary sources (PubMed), secondary sources (guidelines, CAT Crawler, evidence-based summaries: Bandolier, clinical evidence</li> <li>- Choose a sample: sample, variation, reducing variation, statistical methods, random sampling, choosing based on age, socio-economic status and/or health characteristics.</li> <li>- Assigning sample into groups: intervention group, control group, exposed group.</li> <li>- Assessment: recall bias</li> <li>- Analysis: strength of the association, relative risk, statistical significance, statistical testing or inference testing, p value, adjustment for cofounders.</li> <li>- Interpretation: causal relationship, supporting evidence for causation.</li> <li>- Extrapolation: generalisations.</li> <li>- Define accuracy and precision measurements and how they impact on decision-making</li> <li>- Apply the concept of a gold standard, construct a 2x2 table, calculate and interpret sensitivity and specificity, interpret predictive values</li> <li>- Critical appraisal calculators.</li> <li>- Evidence-based complementary and integrative medicine.</li> <li>- Applying the evidence: patient values and preferences</li> </ul>
<p>Research project</p>	<p>Lay groundwork for dissertation to follow in next semester</p>

# MSc in Health Informatics

Summer

Module	Description
Dissertation	