

Module Overviews

Action Research in Healthcare (CS6183): Action research is widely used in healthcare to focus on understanding specific situations in their contexts in order to improve practices, facilitated by the collaborations of individuals seeking to effect desired changes, and in the process, generate knowledge and empower stakeholders. This module will provide students with the skills and knowledge to apply the iterative processes of action research to plan, action and evaluate new ideas in healthcare settings.

On successful completion of this module, students will be able to:

1. Differentiate between the categories of action research.
2. Select appropriate databases and successfully retrieve relevant citations.
3. Apply action research methods to plan and action new ideas in healthcare settings.
4. Apply data collection methods, quantitative research methods and qualitative research methods.
5. Apply critical analysis throughout action research activities.
6. Appreciate the strengths and weaknesses of quantitative and qualitative research methods.
7. Acknowledge the ethical considerations involved in research and evaluation.

Applications of Artificial Intelligence in Healthcare (CS6084): While artificial intelligence has shown its potential to transform aspects of healthcare delivery it presents many challenges and raises many questions. To this end, this module will examine artificial intelligence applications in healthcare, the spectrum of technologies involved, how the products and services address the various challenges and the impacts on stakeholders, infrastructure and so forth.

On successful completion of this module, students will be able to:

1. Discuss the benefits and risks of artificially intelligent applications in healthcare specialities.
2. Engage stakeholders to reimagine workflows and processes to harness the potential of artificial intelligence.
3. Advise how information governance aspects will be addressed in this reimagined setting.
4. Apply an appropriate evaluation framework to an artificially intelligent solution.
5. Recognise the downstream effects of artificially intelligence healthcare solutions.
6. Appreciate the need to protect core services while investing in transformation activities.

Decision-Making in Healthcare (CS6104): Decision makers should have the ability to identify and collect relevant information/knowledge and utilise tools to process it, predict the consequences of decisions, make ethical and justified decisions, and adapt decisions to new and changing circumstances. This module will introduce students to the functions, features, roles and limitations of decision-making support tools in healthcare. Students will apply quantitative and qualitative approaches to decision making by applying decision theory and learn to analyse data from various sources.

On successful completion of this module, students will be able to:

1. Describe the components and potential roles of decision support systems in healthcare.
2. Critically appraise evidence for validity and clinical importance.
3. Employ a decision support system to solve problems and interpret the solutions.
4. Discuss knowledge discovery techniques in clinical decision support.
5. Acknowledge the barriers and facilitators to the uptake of decision support systems in healthcare.
6. Appreciate issues involved in the management and development of decision support systems.

Digital Health Applications and Services (CS6562): This module introduces leaders to the underlying principles and concepts of healthcare information systems and digital services so that they are in a better position to understand and evaluate the myriad of approaches that are often presented as silver bullet type solutions. The knowledge gained in this module will be of value to leaders involved in the procurement, adoption and evaluation of health information systems and digital services.

On successful completion of this module, students will be able to:

1. Describe the features and functions of healthcare information systems and digital services and their ability to support direct and indirect delivery of healthcare.
2. Assess the issues that surround the adoption of an information technology system in a healthcare setting.
3. Identify the system architecture and hardware and communications architecture to support a healthcare information system or digital service.
4. Analyse the concept of outsourcing of information system development and assess how appropriate this strategy is in different healthcare contexts.
5. Conduct user acceptance testing and bug reporting.
6. Relate various methods for evaluating and justifying information technology investment.
7. Demonstrate a recognition of the technical, economic, organisational and cultural barriers to adopting a health informatics application.
8. Demonstrate a recognition of how technologies and their methods of implementation impact usage and acceptance by users.
9. Defend the case to outsource the development of an information system or purchase a commercial off the shelf application.

Digital Health Innovation Ecosystems (CS6522): Rapid developments in exponential technologies have paved the way for breakthroughs in the development and adoption of digital technologies, which are set to transform the way we deliver health and social care. Innovating and adopting digital health ecosystem solutions is a dynamic and ever-evolving process requiring cross sector collaboration. To realise the potential of these solutions requires the adoption of an ecosystem mindset to envision the future, align stakeholders, manage boundaries and obstacles, and act and learn. In addition, leaders should possess skills to examine frameworks to design, develop, implement and evaluate digital technologies and innovations, and appreciate that a digital health intervention should adapt and evolve based on understanding user needs and data informed outcomes. This module aims to address these requirements.

On successful completion of this module, students will be able to:

1. Differentiate between digital health, healthcare innovation, digital ecosystems, digital health innovation ecosystems and the components of each.
2. Determine the components of a digital health-based ecosystem considering a healthcare model and context.
3. Examine their understanding of best practices for cultivating and actively orchestrating an innovation ecosystem.
4. Determine how a health informatics ecosystem should adapt and evolve considering security, risk and uncertainty.
5. Acknowledge the requirement for innovative digital health ecosystems.
6. Appreciate the need for sustainable and scalable digital health ecosystems.

Digital Health Project Management (CS6193): Having created a vision and motivated people to buy into this vision a transformational leader manages the delivery of this vision. To this end, this module presents the processes and concepts of project management from the perspective of healthcare information system projects, examining the processes used to manage the development of such systems and considerations needed for their successful implementation.

On successful completion of this module, students will be able to:

1. Describe characteristics of projects and the constraints that need to be managed using project management techniques.
2. Develop project charters and project management plans in the context of different healthcare settings.
3. Establish critical baselines of scope, time and cost through the application of standard techniques to create work breakdown structures, schedules and budgets for digital health transformation projects.
4. Analyse project timelines through the application of the critical path method.
5. Evaluate project performance using progress control mechanisms including earned value management.
6. Acknowledge the criticality of issues such as integrated change management and risk management in projects within different healthcare settings.
7. Appreciate the importance of project communication and overall project governance in healthcare information technology projects.

Fundamentals of Machine Learning for Healthcare (CS6114): While prevention and diagnosis are two areas of healthcare where machine learning applications are beginning to make important contributions, it is recognised that domain knowledge is required to analyse and interpret the outputs of machine learning algorithms and translate successes into healthcare settings. This module will introduce students to machine learning use cases in healthcare and involve students in applying aspects of the machine learning process to datasets which they create.

On successful completion of this module, students will be able to:

1. Describe, explain and compare machine learning algorithms.
2. Integrate data from various sources to form a dataset.
3. Execute common data preparation tasks.
4. Apply basic machine learning algorithms.
5. Analyse the results generated from applying machine learning algorithms.
6. Appreciate the need to perform data preparation tasks even on good quality healthcare data.
7. Recognise the merits and limitations of machine learning.

Health Information Management (CS6542): Healthcare information is the lifeblood of organisations associated with healthcare delivery and administration and therefore, needs to be governed from various dimensions. Models are particularly useful to designers, operators and developers of information systems and for communication between the various stakeholders. While this module will introduce students to the principles of information modelling and information processing, significant emphasis will be placed on the governance of information from the dimensions of people, processes, policies, standards and technologies.

On successful completion of this module, students will be able to:

1. Describe and assess the as-is situation and model the to-be situation of healthcare processes.
2. Conduct information governance assessments.
3. Describe the privacy, access, confidentiality, ethical, legal and security issues surrounding health information and health informatics applications.
4. Design and specify the tables for a database.
5. Discuss systems standards, vocabulary standards, messaging standards and security standards applicable to health information and health informatics applications.
6. Propose appropriate technical solutions to overcome information governance challenges.
7. Appreciate the requirement to make improvements in information governance on a continuous basis.

8. Acknowledge that people require training in information governance and an organisation needs information technology solutions for people to comply with information governance requirements.

Healthcare Applications Development (CS6154): The module will focus on the creation of platform-independent applications to support healthcare delivery. Students will be introduced to the basics of mobile application development and gain experience in the use of a modern application development framework.

On successful completion of this module, students will be able to:

1. Demonstrate a solid understand of standards, guidelines, frameworks and best practices relevant for the development of mobile health applications.
2. Recognize the capabilities and limitations of mobile devices.
3. Select an appropriate development environment to design and implement aspects of a platform-independent mobile health application.
4. Conduct an evaluation of work developed and revise the application based on feedback.
5. Acknowledge the challenges associated with the design, development and evaluation of platform-independent mobile health applications.

Healthcare Design Thinking (CS6532): Healthcare systems face a myriad of challenges when trying to remove inequalities, increase access, enhance experiences of stakeholders, adopt technologies and innovations, reduce costs, and at the same improve health outcomes. This module will explore how taking a systematic and collaborative approach in the form of design thinking to creatively design digital processes, solutions and services can enhance healthcare ecosystems to reduce inefficiencies and improve outcomes.

On successful completion of this module, students will be able to:

1. Explore and describe the present to broaden understanding of the problem.
2. Build empathy with patients their advocates and providers to understand their challenges/needs.
3. Ideate creatively, mindfully and collaboratively from the insights gained.
4. Prototype and test ideas that address the opportunity.
5. Apply design thinking techniques and tools to design a digital process, solution or service to enhance a healthcare ecosystem.
6. Appreciate how design thinking enhances innovation activities in terms of value creation and sustainability.
7. Display a professional commitment to improving healthcare practices within the bounds of their area of responsibility.

Introduction to Deep Learning in Healthcare (CS6144): Nowadays, deep learning architectures underpin a lot of high-end innovations in healthcare. This module aims to introduce students to the key components of deep learning architectures, use-cases of their application in healthcare. In addition, students will be introduced to deep learning frameworks and get the opportunity to undertake practical exercises using these.

On successful completion of this module, students will be able to:

1. Identify the key components of artificial neural networks and convolutional neural networks.
2. Discuss healthcare applications of deep learning.
3. Demonstrate the application of deep learning frameworks.
4. Compare and contrast deep learning architectures.
5. Acknowledge issues surrounding the use of deep learning techniques in healthcare.

mHealth Apps and Devices (CS6213): mHealth devices embedded in the latest technologies connected with apps installed on smart devices are beginning to form a significant part of health information technology functions. Therefore, this module will introduce students to the various ecosystems, applications, enabling technologies as well as considerations for the design, governance, implementation challenges and evaluation of systems to support these functions.

On successful completion of this module, students will be able to:

1. Describe the functions and challenges of mobile, internet of medical devices and wearable technology ecosystems.
2. Understand the need to regulate applications and devices in these ecosystems to ensure the safety of citizens.
3. Select appropriate technologies for a given health and wellbeing situation.
4. Engage with relevant stakeholders to design and evaluate a mHealth app for a context.
5. Discuss the implementation and maintenance challenges given a context.
6. Appreciate the need to engage a variety of stakeholders to deliver personalized and adaptable intelligent health and wellbeing systems.
7. Appreciate the governance challenges associated with such systems.

Project Definition A (CS6552), Project Definition B (CS6203), Transformation Project A (CS6233), Transformation Project B (CS6094): The rationale for this suite of modules is to allow students, through the medium of undertaking a substantial group project, to integrate and apply their previous learnings and to develop a digital transformation solution or capability that will have a significant positive impact for their health service. A second objective of these modules is to allow students to exercise, and hone, their presentation and writing skills.

On successful completion of these modules, students will be able to:

1. Establish a clear end-state vision and define the scope of a transformation programme.

2. Develop a roadmap showing how an organisation will get from their as-is state to the desired end-state vision.
3. Assess the feasibility of the end-state vision, taking cognisance of the social, legal, ethical and technical issues and ensuring compliance with the standards and regulations governing systems in this domain.
4. Acknowledge the need to address people, processes, technology, and physical infrastructure concurrently.
5. Appreciate the need for effective, two-way communication with each key stakeholder group throughout the transformation.