HIT Course Description

Course Id	Course Name	English
13743	Cloud Computing	This course provides a hands-on experience and study of Cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS). Mainstream Cloud infrastructure services and related vendor solutions are also covered in detail. PaaS topics cover a broad range of Cloud vendor platforms including AWS, Google App Engine, and Microsoft Azure. The SaaS and PaaS topics covered in the course will familiarize students with the use of vendor maintained applications and processes available on the Cloud on a metered on-demand basis in multi-tenant environments. Through hands-on assignments and projects, students will learn how to configure and program IaaS services. They will also learn how to develop Cloud-based software applications on top of various Cloud platforms, how to integrate application-level services built on heterogeneous Cloud platforms, and how to leverage SaaS and BPaaS solutions to build comprehensive end-to-end business solutions on the Cloud.
13761	AI for health systems	The course is divided into four parts; the first covering knowledge representation, the second introducing heuristic search and constraint satisfaction and the third is dedicated to advanced topics such as rule-based expert systems, case-based reasoning, and model-based reasoning. The fourth part is dedicated to machine learning techniques and theory. The following topics will be discussed in the course: introduction to AI and applications; exhaustive search methods; heuristic search methods; first order logic for knowledge representation; other knowledge representation schemes such as semantic networks, frames; production rule systems; principles of expert systems; knowledge acquisition, planning and scheduling, machine learning techniques: decision trees, neural networks, instance-based-learning, naïve bayesian learning, bayesian networks and learning theory.
14722	Data Mining	This course provides a practical and technical introduction to knowledge discovery and data mining. The topics that will be covered in this course include: problems of data analysis in databases, discovering patterns in the data, and knowledge interpretation, basics of extraction and visualization. The topics include all data mining and machine learning techniques that are used for descriptive and predictive analysis, such as clustering, association rules mining, classification, and prediction. This course is an important course for those interested in joining the data science workforce, and for those who need to obtain more experience in data mining.

13762	Enterprise Healthcare Information Systems	This course intends to frame the student with the actual situation of enterprise information systems development and integration. In this course, students will learn how to cover the need of developing solutions that are efficiently integrated with existing ones (legacy) and at the same time leverage the new business paradigm rules: flexibility to multimodal support, agility to easily adapt and react to continuous requirements changes and interoperability with different solutions. Cloud-based multi-enterprise information systems scenarios will be considered. All this within the context of a health services provider organisation.
13763	Medical Image Perception (Processing)	The purpose of this course is to acquaint students with the theory and application of a range of methods used to process medical images, enhance their quality and help to extract useful information from them. The course focuses on a variety of topics including pattern recognition techniques, visualization, segmentation, registration, and image guided intervention. The course also covers selected region based, edge based, hybrid and model based segmentation techniques, plus feature analysis, pattern analysis, clustering, classification algorithms, and their application in segmentation and recognition of objects. Concepts of image transformation and commonly used validation techniques in medical image analysis will also be included.
13764	Knowledge Management Systems	The need to track and facilitate the sharing of the core knowledge resources in contemporary organisations is widely recognised. This course will provide a comprehensive introduction to the area of Knowledge Management (KM) from both technological and organisational perspectives. Students will review and discuss a range of published papers, case studies, and other publications that deal with a range of important KM-related topics. One of the key knowledge management technologies, Business Intelligence Systems, will be covered in detail. The course also includes hands-on work using the BI (Online Analytical Processing- OLAP) tool, COGNOS. Some of the main themes to be covered will include: KM- Conceptual Foundations; Taxonomies of organizational knowledge and KM mechanisms; Case/Field Studies of KM Initiatives; Data Warehousing and OLAP/Business Analytics; Data, text, and web mining; Social media, crowdsourcing, and KM; Big data and actionable knowledge.
13765	Quality Frameworks for Health Innovation	This course concentrates on the rigorous development of high quality software systems within the context of health information systems. Topics covered in this course include software process, software verification and validation (testing, inspection), software metrics, and software maintenance. Students will be equipped with necessary processes, methods and techniques for developing quality software, for assessing software quality, and for maintaining the quality of software. Students will be familiar with software testing at the unit, module, subsystem and system levels, automatic and manual techniques for generating and validating test data, and the testing process, static vs. dynamic analysis, functional testing, inspections and reliability assessment. Trade-offs between software cost, schedule, time, and quality, integration of quality into the software development process as well as the principles of test planning and test execution.

13766	Health Technology Evaluation	In this course, students will learn how to assess different technologies within the context of health information systems. This is a multidisciplinary process that uses explicit methods to determine the value of a health technology at different points in its lifecycle. The purpose is to inform decision-making in order to promote an equitable, efficient, and high-quality health system. The process uses state-of-the-art methods to consider the best available evidence. The dimensions of assessment include comparisons to existing alternatives, clinical effectiveness, safety, costs and economic implications, ethical, social, cultural and legal issues, organisational and environmental aspects, as well as wider implications for the patient, relatives, and the population. This process will help the involved stakeholders and decision makers.
13767	Qualitative Methodologies & Study Design	This course will develop students skills with how to formulate appropriate qualitative research questions, collect qualitative data using interviews and focus group discussions, and analyze qualitative data in the health field. Students will be exposed to different styles of presenting qualitative research results, and will consider different ways in which qualitative data is used in practice. The course has objectives related to both qualitative data collection in addition to qualitative data analysis and writing.
13768	Visual Analytics (Data Visualization)	This course covers the essential exploratory techniques for summarizing data. These techniques are typically applied before formal modeling commences and can help to inform the development of more complex statistical models. Exploratory techniques are also important for eliminating or sharpening potential hypotheses about the world that can be addressed by the data. The course will cover in detail the plotting systems using various tools as well as some of the basic principles of constructing data graphics. It will also cover some of the common multivariate statistical techniques used to visualize high-dimensional data. The course also aims to facilitate the data analytics process through Information Visualization. The challenge for Visual Analytics is to design and implement "effective Visualization methods that produce pictorial representation of complex data so that data analysts from various fields (bioinformatics, social network, software visualization and network) can visually inspect complex data and carry out critical decision making.
13769	Health and Risk Management	This course introduces and defines the main types of risks that the Health Information System HIS in organizations may face and need to consider to ensure their security and business continuity. This course focuses on the identification and assessment of assets, threats and vulnerability in HISs in order to plan the appropriate information system security in the organization. It will survey preventive and containment techniques available to address the potential risk areas. The contingency planning, incident response planning, business continuity planning and disaster recovery will be covered too.

13770	Health Information Systems	In this course, students will learn the basics of healthcare informatics, combined with healthcare data, information technology, and business, and the role of technology in this business. Students will learn the benefits of Health Information System (HIS) including Organized & Coordinated Treatment Process, Improved Patient Safety, Circumvention of Medical Errors, Instant & Seamless Accessibility to Patients' Details, Minimized Operational Expense, and Improved Patient Satisfaction. Students will also learn what are the most important features that distinguish a good HIS, such as Patient Portal, Medical Billing, Patient Scheduling, ePrescribing, and Remote Patient Monitoring.
13771	Database Management Systems	In this course, students will learn the important role of database systems as a data store for critical health information system's data. This course includes basic concepts of databases. DBMS components. Transaction management. Data modeling. Entity relationships diagrams. Relational databases. Database integrity constraints. Relational Algebra. Query languages. Dependencies, schema designs normalization and redundancy elimination. Recovery System, Concurrency Control, Distributed Database, Security and privacy. Students will be asked to write a technical report about a selected topic and in-class presentation.
13772	System Analysis and Modelling	Fundamental concepts. Notion of a system. Information system. System life cycle. Approaches to system analysis and design (classical, structured and object-oriented). Preliminary and Detailed Analysis. Feasibility analysis. Workflow and Dataflow Diagrams. Structured English. Decision Tables etc. Criteria for software design and evaluation: module coupling, cohesion, modularity, portability. A project is required from each student to be presented in the class as well.
13773	Biostatistics	The objective of this course is to develop an understanding of modern computationally intensive methods for statistical inference and exploratory data analysis. Advanced computational methods for statistics will be introduced, including univariate, multivariate and combinatorial optimization methods and simulation methods. In addition, the course will demonstrate how to apply the above techniques effectively for use on large data sets in practice. Finally, this course will show how to make inferences about populations of interest in data mining problems. In addition to that, other topics that will be covered include: theory of sampling distributions; principles of data reduction; interval and point estimation, sufficient statistics, order statistics, hypothesis testing, correlation and regression.
13774	Epidemiology Methods and Uses	This course provides students with core skills in epidemiology, particularly the ability to critically appraise public health and clinical epidemiological research literature regarding public health and clinical issues. This course covers: study types; measures of frequency and association; measurement bias; confounding/effect modification; randomized trials; systematic reviews; screening and test evaluation; infectious disease outbreaks; measuring public health impact and use and interpretation of population health data. It teaches the important models which are used to predict epidemic spreading and convergence points.

13775	Health Information System Security	This course focuses on the fundamentals of information security related to Health Information System (HIS). Students will learn the principles of information security, security architectures and models, and aspects and methods of information security such as physical security control, operations security, access control, hacks/attacks/defense, systems and programs security, cryptography, network and web security worms and viruses, and other Internet secure applications. The course covers the following topics: system security issues, authentication systems, IP security, web security, access control firewalls, data integrity through encryption, virtual private networks, SSL, SSH, and IPSec.
13791	Research methodology	The aim of the course is to provide the students with skills needed to undertake graduate level research and an appreciation of relevant ethical, professional, and legal issues. The overall purpose is to ensure that the students gain research skills that will support them in the rest of their program, in their future careers, and that they will undertake their research activities in an ethical and professional manner. The practical outcome of the course is an understanding on how to research and write critically so that your MSc projects will be a success. This course covers the following topics: nature of research, types of research, research process and its management, ethical issues in research, outlining research problems and developing research questions, research methods, qualitative and quantitative approaches, literature surveys and critical analysis and evaluation of sources, data collection and data analysis, critical evaluation and appraisal of published work and data sets, structuring a research report, professional, ethical and legal issues that relate to the relevant program of study.
13776	Capstone Project	Students will conduct an individual study to demonstrate the ability to formulate, investigate, and analyze a problem and to report results. Written reports and oral presentation are required. The project proposal must be approved by a major professor and/or supervisory committee. The project document should be written with direction from a major professor and/or supervisory committee and in accordance with the description to be provided to students. upon completion, both the project and the document must be successfully defended to the department in an open forum with approval from the major professor and/or supervisory committee.
13777	Special Topics in Health Technology	This course covers recent trends and issues in the field of data science selected from different areas in data science that are not covered in the description of the courses listed in the curriculum. The subject will be suggested by the instructor of the course, subjects include deep learning and knowledge-based systems. Students are assigned individual projects in specific fields. Project reports and seminars will be required for the students to demonstrate their ability in research and oral presentations. Projects are discussed in groups to involve the whole class in these subjects.
13779	Thesis	The student should be able to apply relevant knowledge and abilities, within the main field of study, to a given problem within given constraints, even with limited information, independently analyze and discuss complex inquiries/problems and handle large problems in the advanced level within the main field of study reflect on, evaluate and critically review one's own and other scientific results. The student should be able to document and present one's own work with strict requirements on structure, format and language usage. The student should be able to identify one's need for further knowledge and continuously develop one's own knowledge.