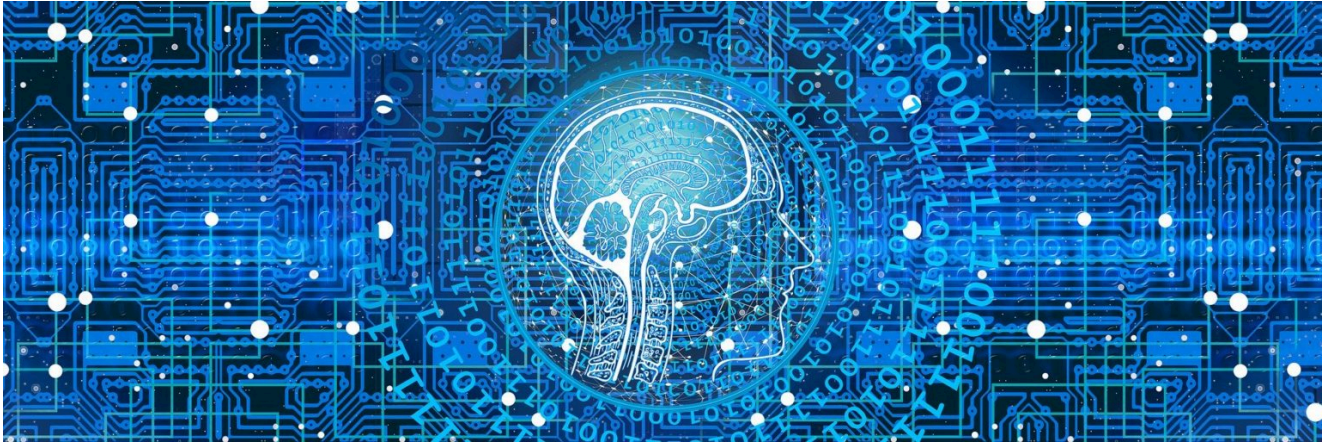**Teaching and Learning**
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M.Sc. Computer Science – Future Networked Systems

Future Networked Systems – Core Modules

CS7CS3 – Advanced Software Engineering

(Semester 1 & 2, 10 ECTS) Assess the theory of classic architecture principles and apply an appropriate architectural model in a team-based application under development

CS7CS4 – Machine Learning

(Semester 1, 5 ECTS) Understand what machine learning is and how it works.

CS7CS6 – Research and Innovation

(Semester 1, 5 ECTS) Locate, obtain and critique relevant knowledge and evidence to support innovation and research

CS7CS5 – Dissertation

(Semester 3, 30 ECTS) Engage in a sustained piece of individual, academic research on a chosen topic within the field of computer science.

CS7NS2 – Internet of Things

(Semester 2, 5 ECTS) In this module, students will explore the prevailing vision for an Internet of Things in
a practical, pragmatic manner.

CS7NS5 – Security and Privacy

(Semester 2, 5 ECTS) The objectives of this module are: to develop an in-depth understanding of risk, data
privacy, threats and risks of security breaches, an awareness of computer security (cryptographic) and protocol techniques, and an ability to make appropriate decisions about securing data.

CS7NS4 – Urban Computing

(Semester 1, 5 ECTS) This module aims to provide both a theoretical and practical understanding of urban
computing and associated cyber-physical concepts, principles, challenges and solutions.

CS7NS1 – Scalable Computing

(Semester 1, 5 ECTS) This module aims to provide a theoretical and practical understanding of modern scalable systems and architectures, from billions of highly distributed Internet of Things devices, through to present and future concepts, such as Quantum and Nanotech systems.

CS7NS6 – Distributed Systems

(Semester 2, 5 ECTS) This course takes a critical look at some of the architectural issues involved in, and paradigms available for, the construction of large-scale distributed systems such as the infrastructures supporting Google's search engine or Amazon's online sales platform. In particular, the course considers how to develop systems that must make trade-offs between performance, consistency, reliability, and availability.

Future Networked Systems – Elective Modules

CS7DS2 – Optimisation Algorithms for Data Analysis

(Semester 2, 5 ECTS) The aims of this module are to give the student skills to model, analyse and solve optimisation problems that arise in data analytics and modern computing and communication systems.

CS7DS3 – Applied Statistical Modelling

(Semester 2, 5 ECTS) This module continues on from CS7CS4 (Machine Learning) with a focus on sampling methods and topical applications.

CS7GV5 – Real-Time Animation

(Semester 2, 5 ECTS) The aim of this module is to provide students with a deep understanding of the theory and techniques behind real time animation.

CS7IS2 – Artificial Intelligence

(Semester 2, 5 ECTS) Appreciate the scope, applications and limitations of artificial intelligence;

CS7IS3 – Information Retrieval and Web Search

(Semester 1, 5 ECTS) Explain the process of content indexing in information retrieval including stop word removal, conflation (stemming, string-comparison), and the language dependency of these methods.

CS7NS3 – Next Generation Networks

(Semester 1, 5 ECTS) This module aims to provide both a theoretical and practical understanding of
modern and next generation networking and systems concepts, principles, practices and technologies. Contemporary and emerging wired and wireless network systems are targeted.

CS7GV2 – Mathematics of Light and Sound

(Semester 1, 5 ECTS) Wave equation and its solution; Maxwell´s equations; Fourier transform and analysis; vibration; mass-spring-damper systems; numerical methods; simulation software.

CS7DS4 – Data Visualisation

(Semester 1, ECTS 5) This module aims to equip the student with the knowledge and tools to visualise data in ways that give insight and understanding.

CS7GV4 – Augmented Reality

(Semester 2, 5 ECTS)
This course covers fundamentals and state-of-the-art in augmented reality, as well as related areas of 3D computer vision and graphics.

CS7DS1 – Data Analytics

(Semester 1 & 2, 10 ECTS) To understand the theory and be able to apply the following techniques
to a set of data.

CS7IS4 – Text Analytics

(Semester 2, 5 ECTS) Grasp the scope and limitations of finite state methods in text analysis.

CS7IS5 – Adaptive Applications

(Semester 2, 5 ECTS) User modelling, including Task modelling
User preferences

CS7GV3 – Real-Time Rendering

(Semester 2, 5 ECTS) This module deals with programming for GPU pipeline architectures e.g. geometry,
rasterisation, texturing, fragment / pixel and vertex shaders.

CS7GV1 – Computer Vision

(Semester 1, 5 ECTS) Image processing, feature detection and matching, image registration, recognition
and segmentation – Motion flow and object tracking in video – Mathematics for computer vision.

CS7GV6 – Computer Graphics

(Semester 1, 5 ECTS) An introduction to computer graphics; problem domain and applications.

CS7IS1 – Knowledge and Data Engineering

(Semester 1, 5 ECTS) The module is designed to explore the management, delivery and inter-operability of knowledge, information and data through knowledge and data engineering.