



Master of Science in Communication Software & Networks

□ ... PROGRAMME OBJECTIVES

The MSc (Communication Software & Networks) programme equips students with leading-edge knowledge in computer networks and software engineering necessary for the design and development of communication software systems. It integrates classroom lectures with software development, programming practice, and project management to enhance students' learning experience and practical skills. Coupled with opportunities for independent studies and research in areas beyond the classroom domain students acquire lateral thinking skills and the acumen necessary for adapting technological changes and meeting challenging demands in the Information communication industry.

□ ... ADMISSION REQUIREMENTS

- Applicants must possess a good Bachelor's degree in electrical/electronic or computer science or such qualifications and experience as the Academic Board may approve.
- Preferably with a minimum of two years of relevant working experience after obtaining the first degree.
- Minimum TOEFL score of 570 for graduates from Universities with non-English medium of instruction.

□ ... PROGRAMME DURATION

The minimum and maximum periods of candidatures for full-time and part-time programmes and the academic calendar are:

Period of Candidatures	Minimum	Maximum
Full-Time	1 year	3 years
Part-Time	2 years	4 years

Semester 1(Aug-Dec); Semester 2 (Jan-May)		
Weeks 1-14*	Weeks 16-17	Weeks 18-19
Lectures/Projects	Examinations	Projects/Labs

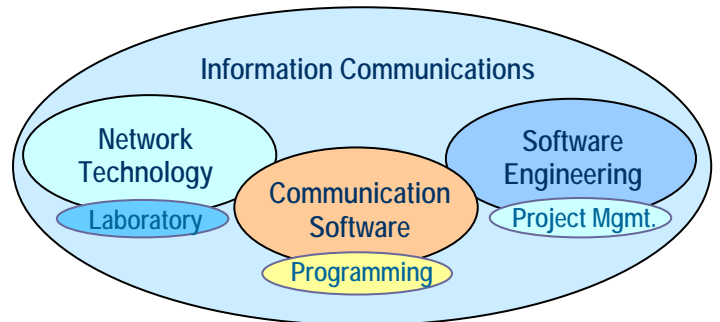
* including 1 recess week

□ ... PROGRAMME STRUCTURE

All students are required to take 4 core subjects and 4 elective subjects. Each subject consists of 39 hours of lectures and is assigned with 3 Academic Units (AUs).

Core Subjects
<ul style="list-style-type: none"> ▪ Computer Networks ▪ Multimedia Networking ▪ Software Requirements Analysis and Design ▪ Object-Oriented Software Development
Elective Subjects (Select any 4 subjects)
<ul style="list-style-type: none"> ▪ Network Performance Analysis ▪ Network Planning and Management ▪ Network Design and Simulation ▪ Network Traffic Engineering ▪ Wireless Networking ▪ Distributed Multimedia Systems ▪ Real Time & Embedded Systems ▪ Network Programming

Note: Curriculum subjects may be changed without prior notice



In addition to the coursework, students are required to complete a group software project or an individual research project of 6 AUs each. Students must complete a total of 30 AUs to fulfill the MSc degree requirements.

Communication Software Project (CSw)

- This project bridges the theoretical knowledge and programming concepts acquired in class with software development and project management practices, and creates the opportunity for student to carry out independent studies and contribute towards the group's solution. Students aiming to be technical specialists and project managers in the infocommunication industry will benefit from this real-life experience.

Research Project

- This project provides students with the experience in conducting an individual research and writing a dissertation on an approved topic. Students aim to establish themselves as researchers in the infocommunication areas will benefit from completing this research project.

Both full-time and part-time programmes follow the same semestrial structure. Lectures are normally conducted in the evening. Each lecture is typically 3-hour long. Lab-based subjects and projects are conducted in the day for full-time students. Typical subject loadings for programme completion within the minimum durations are as follows:

Full-Time	Part-Time	
	Year 1	Year 2
<ul style="list-style-type: none"> ▪ 4 Core subjects ▪ 4 Electives ▪ 1 CSw project or 1 Research Project 	<ul style="list-style-type: none"> ▪ 3 Core ▪ 1 Electives 	<ul style="list-style-type: none"> ▪ 1 Core ▪ 3 Electives

* CSw – Communication Software Project

□ ... APPLICATION FOR ADMISSION

Applications for admission are normally invited through the press and announced at the Graduate Studies Office (GSO) web site in January for admission in August of the same year. All applications must be submitted online through the GSO web site at:

<http://www.ntu.edu.sg/GradStudies/Coursework+Programmes/>

More information on application dates, online submission, international candidates, as well as tuition fees and financial assistance are available at the GSO web site.

All enquiries on application matters and submission procedures should be directed to gradstudies@ntu.edu.sg

□ · · · SUBJECT CONTENTS

Core Subjects

Computer Networks: Network protocols and services. Transport protocols and services. Local area networks. Wide area networks and internetworking. Broadband and Asynchronous Transfer Mode (ATM) networks.

Multimedia Networking: Introduction to multimedia networks. Quality of service and traffic characteristics. Traffic scheduling. Multicasting mechanisms. Resource reservation. Multimedia communication protocols. Networked multimedia applications issues.

Software Requirements Analysis and Design: Overview of software engineering. Object-oriented modelling concepts. Object modelling. Dynamic modelling. Functional modelling. System design. Object design. OO methodology and tools.

Object-Oriented Software Development: Software development platform, language and environment. Object-Oriented implementation in C++. Object-Oriented implementation in JAVA. Distributed Object-Oriented programming. Comparative study of Object-Oriented programming languages. Software reuse.

Elective Subjects

Network Performance Analysis: Review of probability theory and graph theory. Queuing theory. Networks of queues. Flow and congestion control. Routing-flow allocation. Controlled and random access techniques in data networks. Performance analysis of circuit switching.

Network Planning and Management: Network performance issues. Network simulation and optimisation. Network operations, control and maintenance. Network administration. Network management database and tools. Capacity planning. Network security and integrity

Network Design and Simulation: Introduction to network design. Approaches to network design. Topological network design. Network reliability. Network design simulation. Data analysis.

Network Traffic Engineering: Internet architectures, service models and network layer protocols. User services and source traffic models. Traffic measurement, estimation and forecasting. Performance analysis and simulation tools. Traffic control and resource management.

Wireless Networking: Overview of wireless network protocols. Signalling protocol in wireless networks. Medium access control (MAC) protocol in wireless networks. MAC protocol design strategy for wireless networks and case study. Emerging technologies for broadband wireless networks.

Distributed Multimedia Systems: Media and Media Systems. Multimedia Storage. Media Processing and Application. Media Transmission and Delivery. Quality of Service on Distributed Multimedia Systems. Multimedia Applications.

Real Time & Embedded Systems: Fundamentals of real time and embedded systems. Real time operating systems. Design methodologies. Development, debugging tools and programming languages. Reliability. Case studies and applications.

Network Programming: Windows NT system-level programming. UNIX system-level programming. Kernel programming. Data communication protocol project.

□ · · · CAREER PROSPECTS

Students in the programme acquire the relevant domain knowledge in computer networks and software engineering through coursework and research, and skill sets in software development, programming, and project management through a software group project. This combination of coursework and project equips graduates

with the technical competencies and practical abilities to adapt to fast technological advances in the Infocommunication industry and provides a wide job opportunities in Applications and software development, Technical and specialist support, Infocommunication top and middle management, Infocommunication consultancy, education, and research.

□ · · · PROGRAMME COMMENTS

Their skills are well matched for our jobs

"Last year we hired 2 Master of Science (Communication Software and Networks) graduates in our company, and we find that their skills are well matched for our jobs. The course (Communication Software and Networks) has provided them with strong foundation in computer networks and software programming."

-- Boh-Lim, GSG-SGP, Motorola, Operations Manager, May 19, 2006

A rigorous and demanding programme with emphasis on higher order learning and dedicated teaching staff

"A rigorous and demanding programme that covers the breadth and depth in networking. The programme efforts to emphasis on higher order of learning is commendable and in my observations teaching staff are dedicated in their work, highly competent and able to offer timely advised and share their knowledge with students."

--Tok Nam Huat, Class 2004

A programme that stimulates me to do research

"This programme encourages me to read and do a research for all the material being taught in the class. I really enjoy my research experiences in my dissertation project. The whole process, interaction and discussion with my supervisor really open my view."

--Wagio, Class 2004

A gateway to the student's dream reality

"A gateway to the world of communication technologies. The professors of ICIS, with their greatest knowledge and experience make the student's dream a reality"

--Rajbabu C Gunaseelan, Class 2003

A wonderful program that is of real industrial value and highly valued by prospective employers

"I am thankful for ICIS and NTU for providing such a wonderful program that is of real industrial value and highly valued by prospective employers. I am proud to say that my Masters degree from ICIS has given me great self confidence and self image and I can proudly say that an ICIS graduate clearly has a cutting edge over his colleagues in any big company"

--Sundaresan Krishnamurthy, Class 2003

A wonderful experience of a well-designed programme and impressive lab facilities

"It was a wonderful experience spending a year in NTU. The programme was well-designed to cover all aspects of Computer Networking and Software Development. The course contents were also very well tailored to meet the programme's specific goals. I found the teachers to be very competitive and knowledgeable in their fields. The lab facilities are also very impressive"

--Mansoor Ali Khan, Class 2003

□ · · · ADDITIONAL INFORMATION

More details on the programme are available at ICIS web site: <http://www.icis.ntu.edu.sg/courses/msc/Msc.htm>

For additional information, please contact:

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Information in this leaflet is correct at time of printing.