MSc in Computer Science

2025 Intake

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIVERSITY OF MORATUWA

SPECIALIZATIONS

The MSc in Computer Science (MSc in CS) postgraduate degree program is designed to provide practicing professionals with a greater depth of technical knowledge as well as exposure to emerging and niche areas.

The following specializations within the MSc in CS program allow students to concentrate on an area of study that interests them:

- Cloud Computing
- Computer Networks
- Data Science, Engineering and Analytics
- Information Systems Management
- Mobile Computing
- Parallel Computing
- Security Engineering
- Software Architecture

Details of the specializations are as follows:

- **Cloud Computing**

  Cloud computing has transformed the way we host and run applications, enabling us to acquire vast, scalable computing and storage resources as and when needed. As every computing device and application now having a cloud backend, there is a huge demand for professionals that can design and develop cloud-enabled applications as well as integrate and manage cloud services. This specialization is targeted towards preparing cross-skilled cloud architects, engineers, and developers to address this rising demand. Areas of study under the specialization include cloud technologies, cloud and client-side software

development, distributed systems, as well as fundamentals of cloud systems, information security, and networking.

- **Computer Networks**

This specialization focuses on the design, operation, and management of computer networks and for those who intend to become senior systems engineers, network operations center (NOC) managers, and network design and performance engineers. The specialization is designed to provide specialized knowledge and skills in wired/wireless networks, routing, switching, systems engineering, and network security, design, and management, as well as recent and emerging topics including cloud-based systems, software defined networking, and content concentric networking.

- **Data Science, Engineering, and Analytics**

The exponential growth of the data accumulated by the mankind has resulted in the phenomenon commonly referred to as Big Data – large, complex data sets that are impossible to comprehend for humans. This specialization explores the unique challenges and opportunities presented by Big Data. Areas of study under the specialization include data mining, information retrieval, concepts and techniques of machine learning, and the emerging disciplines of data science and business intelligence. This specialization is useful for professional who would like to embark on a career as data scientists or data mining experts, and professionals who would like to work as software engineers on endeavors related to Big Data.

- **Information Systems Management**

This specialization focuses on the design, operation, and management of large scale information systems and is intended for those who are planning to become senior IT managers, IT project managers and senior IT consultants. The

specialization is designed to provide specialized knowledge and skills in the areas of information systems management, software engineering, IT project management, socio-technical analysis of ICT and future trends for digital enablement.

- **Mobile Computing**

The advancements in computing and communication technologies have fueled an exponential growth in the use of mobile computing and the consumer market is converging to mobile computing technology at a rate faster than any other technology in the history. This disruptive growth has already become a trillion Dollar business and the computing industry from leading global players to small local businesses are preparing for this wonderful paradigm shift. The mobile computing specialization is targeted towards preparing mobile computing architects required to drive the next generation, context-aware ubiquitous applications, which will be the frontier of the mobile computing and consumers. The core of the specialization explores topics such as context awareness, ubiquitous computing, Internet of things, wireless networks, mobile clouds and Cloudlets, innovative user interaction techniques, and developing next generation mobile applications.

- **Parallel Computing**

We live in the era in which the performance of computing does not improve automatically as used to be and described by the Moore's Law. Now the way to improve performance is by using several processing elements in parallel, be it smart phones or high-end computer servers. As a result, parallel computing has become ever more relevant to a wide range of computing professionals. This specialization explores the challenges and opportunities presented by all forms of parallel computation. Areas of study under the specialization include study of parallel architectures (ranging from multi-core CPUs and performance

accelerators such as many-core GPUs to heterogeneous clusters and massively parallel systems), concurrency, parallel programming models and techniques, and performance engineering.

- **Security Engineering**

The security of information, software, networks, and systems is one of the most critical requirements in computing, irrespective of whether it is organizational, governmental, research, or commercial. This specialization is for those who intend to become security architects in software engineering, security specialists in systems integration, and information security engineers. The specialization has been designed to match the industry requirement in specialized knowledge and skills in cryptographic techniques, secure software development, network security, vulnerability assessment, and information security management.

- **Software Architecture**

This specialization focuses on the concepts and techniques that lead to superior software architectures and software systems. It explores areas of study such as software architecture styles and patterns, enterprise software architectures, quality engineering, requirements engineering, and distributed computing. The specialization is equally useful for professionals who would like to embark on a career as software architects as well as professionals who would like to become highly productive software engineers.

COURSE MODULES AND PROGRAM STRUCTURE

The MSc in CS postgraduate degree program consists of compulsory modules, specialization-specific compulsory modules, elective modules, and a compulsory research project. The research project is expected to be in the area of specialization.

The program is structured as a six semester (two-year) degree program with each semester consisting of 12 weeks of academic activities. Lectures are held on One/Two weekdays from 5.30 PM to 7.30 PM in Colombo and on Saturdays in the University of Moratuwa. Lectures are also supplemented with online interactions via Moodle, Yammer, Google Hangout, Skype, Lync, etc.

In a typical study program arrangement, the first three semesters consist of taught course modules while the fourth semester is a mix of taught courses and research. The final two semesters are used for the research project and dissertation writing.

The following are the course modules of the program:

Code	Course Modules	Credits
CS5101	IT Project Management	3
CS5102	IT Policy and Planning	3
CS5103	Information Systems Management	3
CS5116	IT and Society	3

CS5202	Advanced Operating Systems	3
CS5203	Advanced Compilers	3
CS5212	Software Architecture Concepts	3

Code	Course Modules	Credits
CS5213	Enterprise Software Architecture	3
CS5214	Principles of Operating Systems	1.5
CS5222	Software Process and Management	3
CS5223	Rapid Application Development	3
CS5224	Advanced Databases	3
CS5225	Parallel and Concurrent Programming	3
CS5226	Secure Program Development	3
CS5227	Data Mining	3
CS5228	Principles of Software Design and Software Engineering	3
CS5229	Big Data Analytics Technologies	3
CS5230	Database Managements Systems	3
CS5242	Software Development on Cloud Platforms	3

CS5243	Client Side Application Development	3
CS5250	Human Computer Interaction	1.5
CS5251	Local-Language Computing	1.5
CS5252	Requirements Engineering	1.5
CS5253	Software Quality	1.5
CS5270	Many / Multi-Core Programming	3
CS5312	High Performance Computer Architecture	3
CS5313	Fault Tolerant Computing	3

Code	Course Modules	Credits
CS5314	Embedded Systems	3
CS5341	Cloud Technologies and Systems	3
CS5401	System and Network Design	3
CS5404	Computer and Network Security	3
CS5405	Performance Modeling and Analysis	3
CS5406	Performance Engineering of Computer Systems	3
CS5414	Current Topics in Computer Networks	3

CS5422	Digital Communication	3
CS5423	Information Security Theory and Practice	3
CS5424	Cryptography Engineering	3
CS5425	Information Security and Cryptography	3
CS5426	e-Commerce	3
CS5429	Distributed Computing	3
CS5430	Mobile Computing	3
CS5431	System Audit and Vulnerability Assessment	3
CS5440	Wireless Access Networks	3
CS5441	Mobile and Ubiquitous Application Development	3
CS5442	Pervasive Computing	3
CS5450	System and Network Administration	3
CS5451	Broadband Networks	1.5

Code	Course Modules	Credits
CS5452	Wireless Networks	1.5
CS5453	Security Management	1.5

CS5454	Digital Forensics	1.5
CS5455	Networks and Protocols	1.5
CS5456	Security Management	3
CS5457	Legal Aspects of Computer Security	1.5
CS5460	Operating Systems Security	3
CS5461	Network Security	3
CS5462	Embedded Systems Security	3
CS5512	Advanced Image Processing	3
CS5513	Computer Vision	3
CS5612	Pattern Recognition	3
CS5613	Neural Networks	3
CS5614	Bio-Informatics	3
CS5615	Information Retrieval	3
CS5616	Natural Language Processing	3
CS5617	Data Science	3
CS5618	Business Intelligence	3
CS5619	Information Systems for Digital Society	3

CS5620	Information Systems Modelling and Design	3
Code	**Course Modules**	**Credits**
CS5621	Machine Learning	3
CS5650	Statistical Analysis	1.5
CS5651	Statistical Inference	3
CS5701	Advanced Algorithms	3
CS5814	IT Law	3
CS5850	e-Learning	1.5
CS5912	Current Topics in Computer Science	3
CS5921	Independent Study 1	1
CS5922	Independent Study 2	1
CS5923	Directed Study 1	1.5
CS5924	Directed Study 2	1.5
CS5925	Directed Study 3	1.5
CS5926	Directed Study 4	1.5

Students are required to earn 60 credits to graduate. 20 of those credits would come from the Research/Industry Projects. Four more credits would come from modules that prepare the students for the Research Project. That leaves 36 credits to be

earned by taught modules. The combination of taught modules to be taken depends on the specialization. If you need any additional information regarding the specializations, course modules or the program structure, please contact the MSc in CS course coordinators through the contact details given on http://postgrad.cse.mrt.ac.lk website.

Note:

Offering of a particular specialization, or a course module during a given academic year is subject to having the minimum number of registrations.

RESOURCE PERSONS

The MSc in CS postgraduate degree program is conducted by senior academics of the University of Moratuwa with research specializations in specific study areas complemented by specialists from the industry.

Prof. Gihan Dias

BSc Eng Hons (Moratuwa), MSc (UCSB), PhD (UCD), MIE(SL), CEng

Professor, Dept of Computer Science and Engineering, University of Moratuwa

Prof. Sanath Jayasena

BSc Eng Hons (Moratuwa), MSc (UIUC), PhD (UIUC), MIE(SL), CEng

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Prof. Indika Perera

BSc Eng Hons (Moratuwa), MBS (Colombo), MSc (Moratuwa), PhD (St Andrews), PGDBM (Colombo), MIE (SL), CEng

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Prof. Chandana Gamage

BSc Eng Hons (Moratuwa), MEng (AIT), PhD (Monash), MIE(SL), CEng

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Prof. Dulani Meedeniya

BSc Hons (Peradeniya), MSc (Moratuwa), PhD (St Andrews)

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Prof. Shantha Fernando

BSc Eng Hons (Moratuwa), MPhil (Moratuwa), PhD (Delft), MIE(SL), MIEE (London), CEng

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Prof. Chathura De Silva

BSc Eng Hons (Moratuwa), MEng (NTU), PhD (NUS), MIE(SL), CEng

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Adeesha Wijayasiri

BSc Eng. (Hons) (Moratuwa), MSc (UFL), PhD (UFL)

Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Charith Chitraranjan

BSc Eng. (Hons) (Moratuwa), MSc (NDSU), PhD (NDSU)

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Kutila Gunasekera

BSc Eng Hons (Moratuwa), PhD (Monash)

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Shehan Perera

BSc Hons (Colombo), MSc (NDSU), PhD (NDSU)

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Ms. Vishaka Nanayakkara

BSc Eng Hons (Moratuwa), Tech Licentiate (Chalmers),

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Uthayasanker Thayasivam

BSc Eng Hons (Moratuwa), PhD (U. Georgia).

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Nisansa de Silva

BSc Eng Hons (Moratuwa), MS (UO), PhD (UO).

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Sapumal Ahangama

BSc Eng Hons (Moratuwa), PhD (NUS).

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Sunimal Rathnayake

BSc Eng Hons (Moratuwa), PhD (NUS).

Senior Lecturer, Dept. of Computer Science and Engineering, University of Moratuwa

Dr. Buddhika Karunarathne

BSc Eng Hons (Moratuwa), PhD (HKUST).

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Thanuja Ambegoda

BSc Eng Hons (Moratuwa), Dr. sc. (ETH).

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Sandareka Wickramanayake

PhD (NUS), BSc Eng. (Hons) (Moratuwa)

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Dr. Chathuranga Hettiarachchi

PhD (NTU), BSc Eng. (Hons) (Moratuwa)

Senior Lecturer, Dept of Computer Science and Engineering, University of Moratuwa

Mr. Chamara Disanayake

MSc (Moratuwa), BSc Eng. (Hons) (Moratuwa), MBS(Colombo), AMIE(SL)

Senior Lecturer, Department of Network and Security, Faculty of Computing, NSBM

Dr. Srinath Perera

BSc Eng Hons (Moratuwa), MS (Indiana), PhD (Indiana)

Vice President - Research, WSO2

ELIGIBILITY REQUIREMENTS

The MSc in CS postgraduate degree program requires a prospective candidate to fulfill the following eligibility criteria for course enrollment.

- The degree of BSc Engineering of the University of Moratuwa in a relevant field, as may be approved by the Senate;

OR

- Any other four-year degree in Engineering, Science or Technology from a recognized University, in a relevant field of specialization, as may be approved by the Senate;

OR

- Any other three-year degree in Engineering, Science or Technology from a recognized University, in a relevant field of specialization, and a minimum period of experience of one (01) year as may be approved by the Senate;

OR

- Any recognized category of membership of a recognized Professional Institute, obtained through an academic route, with a minimum period of experience of one (01) year as may be approved by the Senate.

SELECTION PROCESS

The selection to the MSc in CS postgraduate degree program is through an open competitive process. The applicant's educational qualifications, professional qualifications, commitment to advanced study, demonstrated aptitude for research, English language skills required for preparation of study/research outcomes and knowledge dissemination, and references all contribute to the evaluation of a candidate. Following are the steps in the selection process:

1. Each applicant is evaluated for the conformity with the applicable eligibility criteria based on the information provided with the application. Applicants satisfying the eligibility criteria will be invited to a selection test.

2. The applicants who satisfied the eligibility criteria will appear for an online selection test of one-hour duration. The selection test consisting of multiple-choice, short-answer and similar questions will examine analytical skills, conceptual knowledge, and topic-specific knowledge in areas such as Programming, Data Structures and Algorithms, Operating Systems, Computer Systems and Organization, Software Engineering, Software Architecture, Theory of Computing, Databases, Artificial Intelligence, Networking, Computer Security, Professional Practice, and Management Information Systems. In addition, the candidates will be required to write a short essay (250 words) on a given topic. Successful applicants at the selection test will be invited to a selection interview.

3. The applicants who were successful at the selection test will face an interview of 5-10 minute duration by an interview panel of not less than three persons. The interview will ascertain the applicant's suitability and competency for the study program.

4. Based on the marks received for the selection test and the selection interview, each applicant will be ranked into a "Selected Candidates List" and a "Waiting List". After the selection process, all applicants will be informed of their application status. If an applicant from the Selected Candidates List fails to enroll in the program within the stipulated period, that opportunity will be afforded to an applicant from the Waiting List.

COURSE FEE AND PAYMENT STRUCTURE

The total fee for the course is Rs. 650,000/-, which includes a registration fee of Rs.100,000/- and a course fee of Rs.550,000/-. It can be paid according to either plan A or B as shown below.

Plan A

- Course registration fee - Rs. 100,000/- (by 30th October 2024)
- Full course fee - Rs. 550,000/- (by 18th December 2024)

OR

Plan B

- Course registration fee - Rs. 100,000/- (by 30th October 2024)
- First installment – Rs. 300,000/- (by 18th December 2024)
- Second installment – Rs. 200,000/- (by 04th June 2025)
- Third installment – Rs. 50,000/- (by 04th March 2025)

Above fees include Annual Academic Registration Fees, Semester Examination Fees, and a Library Deposit of Rs. 2,500/-. In the case of change of government taxes, the student will have to incur the additional tax amount.

HOW TO APPLY

1. Pay the application-processing fee.

   The application processing fee of Rs. 2,000/- may be paid either to University Shroff (weekdays from 9.00 AM to 12.30 PM and 1.30 PM to 3.00 PM) or as a pay-in voucher of Rs. 2,000/- obtainable at any Bank of Ceylon branch by paying Rs. 2,000/- to the credit of "University of Moratuwa – A/C No. 306836". You may also make an online transfer to the same account. Please indicate the course as "MSc in CS 2025" and your NIC number on the deposit slip or online transfer form (in case the online form does not allow all of this, please indicate your NIC).

2. Fill up the online application form at http://postgrad.cse.mrt.ac.lk, submit and print the completed application.

   You need to attach all documents indicated in the application form and submit by the application deadline. The copies of degree certificate and the academic transcript you upload must be certified with digital signatures by you and your employer. The digital signature should be a certificate-based Digital ID, obtained either from a cloud-based trust service provider, or from the signer's local system.

   More information on the required type of digital signature can be found here. Once submitted you will receive a PDF of the filled application as a record.

3. Arrange for Letters of Recommendation.

   You are required to provide two (02) Letters of Recommendation.

   Ensure that your reference forms are sent (emailed) to the relevant referees. Request the recommender to use the same e-mail address that you used

while filling up the application, and request the recommender to use the official e-mail address whenever possible.

Once the referees have completed the reference form, they can submit it online. The recommender will receive a confirmation e-mail with an attached PDF as a record. You will also receive a notification to the provided e-mail address.

4. Once your application is processed, you will be notified via e-mail whether you are invited for writing and selection tests and interviews or not. You may also receive e-mail notifications if the selection committee has any queries about your application.

   If you are invited to the selection test (usually will be informed within 1 week from the application deadline), prepare the following application pack and have it ready at the selection test:

   - A printed copy of the completed and signed "Application Form"
   - Your National Identity Card (NIC), Driving License, or Passport
   - Original certificates and copies of academic/professional qualifications, membership of professional institutes, etc.
   - Updated "Curriculum Vitae" of the applicant
   - Completed "Letter of Consent Form" from the employer (if applicable)
   - Letter of sponsorship (if applicable)
   - Copy of the application processing fee receipt

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