MASTER'S PROGRAMMES

NUS | Computing

National University of Singapore

MASTER OF COMPUTING

IN

COMPUTER SCIENCE

INFORMATION SYSTEMS

ARTIFICIAL INTELLIGENCE

INFOCOMM SECURITY

COMPUTING: THE ALL-ACCESS PASS

The universal need for Information Technology (IT) and the crucial role it plays in today's workforce is undisputed. Every day, rapid advances are being made in the way we use IT to enhance performance and function, and there is a massive corresponding demand for tech talent in all industries.

To evolve with the times and manage this tech revolution, organisations are now employing 'Cybersecurity Engineer', 'UX Developer', 'Big Data Analyst', 'Digital Transformation Consultants', 'FinTech Specialist' and the like—new roles created specifically to meet current business needs. Yet, there just aren't enough people with the skills necessary to fill these roles. To remain in the game, the best IT professionals evolve with the times and develop their knowledge and skills to take on these new challenges.

So, whether you're keen to upskill, or break into the field of Computing, our Master's programmes in **Computer Science, Information Systems, Infocomm Security,** and **Artificial Intelligence,** are designed to help you achieve your goals. Experience challenging, comprehensive curricula, informed with the latest innovative research by leading academics, at one of the best computing schools in the world. You'll gain that edge over your competition, and be well-equipped to pursue those long-awaited career opportunities.

WHAT WE OFFER

1 **DEPTH AND BREADTH**

Our curriculum provides not only depth of knowledge in your chosen specialisation with the five core modules you will take, but also the opportunity to develop breadth of knowledge and exposure in other areas when you select your five electives from our diverse selection of over 50 master's-level modules. This allows you the flexibility to customise your education according to your goals and interests.

2 **AWARD WINNING TEACHERS, WORLD CLASS RESEARCHERS & INDUSTRY LEADERS**

You will be taught by faculty members who are not only excellent educators, but also world class researchers and notable industry leaders. So, you will benefit not only from a programme that is informed by the latest research in the field, but also, with our adjunct professors' close ties to industry, one that is enhanced with the knowledge of industry best practices and demands.

3 **ENTREPRENEURSHIP**

There is a strong culture of developing and supporting entrepreneurship and innovation at NUS. In addition to NUS Enterprise's extensive programmes, industry partnerships and funding opportunities, NUS Computing also hosts its own incubation centre, The Furnace, as well as offers grants, awards, facilities, development programmes and mentorship to support our students, alumni and staff members' entrepreneurial goals

4 **NUS CAREER SERVICES & GLOBAL ALUMNI NETWORK**

All NUS students and graduates can make the most of NUS Centre for Future Ready Graduates' career festivals, careers advisory services, resume and interviewing technique workshops, career coaching, and a multitude of other career development programmes.

As an NUS graduate, you will become part of the global NUS alumni network. You will have the opportunity to attend alumni engagement and networking events where you will be able to meet and develop valuable connections with other prominent alumni in your industry.
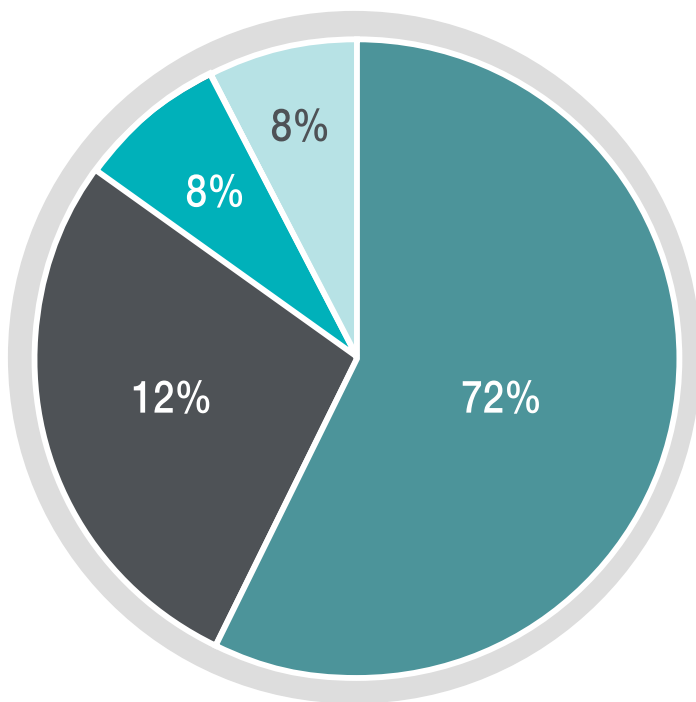
5 **MULTIPLE PATHWAYS**

Our flexible programmes have been designed to accommodate our students' various career stages and commitments. We offer multiple pathways to obtain a Master's degree. Besides the full time and part-time options for those who would like to enrol directly in a Master's programme, you may also opt to take only a few modules at a time, that add up to graduate certificates. These certificates can then be counted towards a Master's degree. If you are an NUS alumni, you can take advantage of the NUS Lifelong Learning Initiative and enjoy the opportunity to study some modules for free for a fixed period.

CLASS PROFILE

(based on data from the last three years)
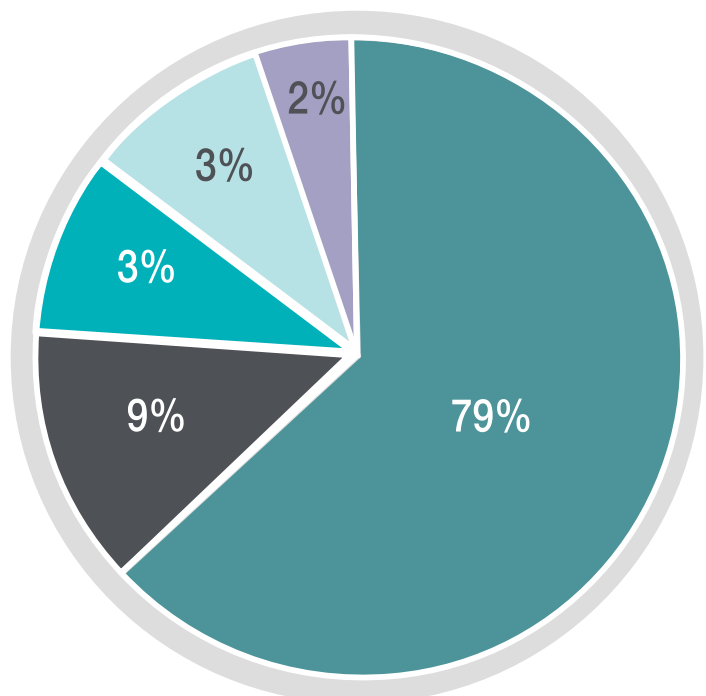
LOCAL STUDENTS' AVERAGE SALARIES AFTER MASTER'S
$5965

97%
HIRED WITHIN 6 MONTHS OF GRADUATION

72%
12%
8%
8%

WORK EXPERIENCE

1 to 5 years
6 to 10 years
11 years & above
Less than 1 year

INDUSTRIES REPRESENTED

- Information Technology
- Scientific Research & Development
- Education
- Engineering/Manufacturing
- Finance & Insurance

79%
9%
3%
3%
2%

COMPUTER SCIENCE

COURSE DESCRIPTION

The Master of Computing in Computer Science (MComp CS) offers you the opportunity to delve deep into the core areas of computer science, hone your expertise, and learn about the recent advances in the field. You will be equipped with knowledge and skills to face new technical challenges and expand your career options as IT professionals and leaders.

The programme emphasises the fundamentals of computer science while providing the flexibility to pursue knowledge in your interest areas. You can choose from a diverse range of modules, spanning areas like computer systems, data management, programming language, software engineering, artificial intelligence (AI), human-computer interaction (HCI), and algorithms. You will also have the option to push the boundaries of innovation and work closely with a professor on a research project of your interest.

SAMPLER OF MODULES

Advanced Operating Systems:
Modern OSes operate in new computing environments that are very different from when UNIX or DOS were written. Explore in-depth coverage on how modern OSes work in today's world where mobile computing, cloud computing, multi-processors systems, virtual machines, and security threats are the norm.

Phenomena and Theories of HCI:
Designing pleasant user experience (UX) and high-functioning user interface (UI) is a science as much as it is an art. Learn the underlying science behind HCI design and different interaction design paradigms. Discover how we can model and measure user interface interaction and achieve a better understanding and prediction of interface design choices.

Computer Systems Performance Analysis:
How do you know what type of servers to buy and how much capacity to provide for a given service? Get a comprehensive foundation in computer performance analysis – how to identify performance bottlenecks, characterise the workload, build analytical models that relate to the parameters of the systems, and predict performance limits under different "what if" scenarios.

Simulation and Modelling Techniques:
One approach to help policymakers answer questions that involve scenarios that cannot be feasibly tried out in the real world is to simulate different "what-if" scenarios in software. Get a primer in the principles and techniques needed to design, build, and analyse simulation models that run efficiently.

Database Applications Design and Tuning:
Creating database tables for storing and querying data efficiently, requires a deep understanding of how data are stored, how they are indexed, how queries are executed. Learn to build and manage well-designed databases that can give order-of-magnitude performance improvements.

Combinatorial and Graph Algorithms:
Many real-world problems, from flights to social connections, can be modelled as graphs. Classic graph algorithms do not always work well in the real world when the input scales to billions of nodes, may change over time, or are stored in different places. Discover how you can adapt classical algorithms to handle data at scale efficiently.

PROGRAMME STRUCTURE

Coursework Option:
Complete 10 modules, with 5 Computer Science specialisation modules

Dissertation Option:
Complete 6 modules, with at least 3 Computer Science specialisation modules
Complete a dissertation in area of specialisation (equivalent to 4 modules)

Project Option:
Complete 8 modules, with at least 4 Computer Science specialisation modules
Complete a project in area of specialisation (equivalent to 2 modules)

Duration:
There are full-time and part-time study options, and you may complete the programme in 1 to 3 year(s).

INFORMATION SYSTEMS

COURSE DESCRIPTION

The Master of Computing in Information Systems (MComp IS) programme will allow you to develop expertise in advanced IT-enabled digital transformation and is designed to prepare you for your transition to IT management and leadership roles. If you want to champion innovative and feasible IT solutions, the MComp IS is the programme for you.

The programme is distinctive in its strong and holistic emphasis on four key pillars: enterprise IT management and transformation, enterprise IT innovation and design, analytics and intelligent systems, and digital entrepreneurship. Our faculty members incorporate the use of state-of-the-art conceptual frameworks to make sense of the complex world of IT-enabled innovation and disruption, as well as the latest practical tools and techniques to tackle real-world problems. You may also select a research-oriented option where you can work with our world-renowned professors on cutting-edge research projects, in your area of interest.

SAMPLER OF MODULES

Digital Transformation:
How do you continuously transform enterprises with the latest technologies without wreaking havoc on business operations? Learn how to formulate and implement effective digital transformation strategies to maintain your organisation's competitiveness.

Enterprise Architecture:
Enterprise architecture is the conceptual blueprint that defines IT structure and operations. Gain a comprehensive understanding of enterprise architecture design and implementation, including methods and frameworks, governance, description language, modelling, viewpoints and visualisations, and analysis of architecture.

Applied Analytics:
Focus on the applications of data analytics by working on group projects and covering a breadth of techniques including predictions, unsupervised, supervised, and semi-supervised learning, social media analytics, text mining, web mining, and image processing.

Pervasive Technology Solutions and Development:
Study the mechanisms and operating environments of pervasive technology, including computer and network architectures for pervasive computing, wearable technologies, Internet-of-Things, mobile computing mechanisms, and user authentication techniques.

IT Strategy and Governance:
Get a C-level perspective of IT strategy and corporate governance, as well as IT's importance as a tool for business competitiveness and transformation. Get insights on the development of business-centric IT strategies, management of innovation and disruption, and the evolving role of the Chief Information Officer (CIO).

Platform Design and Economy:
Digital platforms have transformed the way we live, operate, and interact. Learn about platform economics and API management, as well as how to strategically plan for and measure successful digital platform ventures and develop complementary technologies within a platform ecosystem.

PROGRAMME STRUCTURE

Coursework Option:
Complete 10 modules, with 5 Information Systems specialisation modules

Dissertation Option:
Complete 6 modules, with at least 3 Information Systems specialisation modules
Complete a dissertation in area of specialisation (equivalent to 4 modules)

Project Option:
Complete 8 modules, with at least 4 Information Systems specialisation modules
Complete a project in area of specialisation (equivalent to 2 modules)

Duration:
There are full-time and part-time study options, and you may complete the programme in 1 to 3 year(s).

ARTIFICIAL INTELLIGENCE

COURSE DESCRIPTION

In recent years, as computers become more powerful, and as large amounts of data have become easier to collect and more readily available, new artificial intelligence (AI) and machine learning techniques that can yield human-level accuracy have been developed. This development has led to a surge in applications of artificial intelligence across disciplines, including medicine, finance, engineering, economics, and driven the development of technologies such as self-driving cars and mobile phone personal assistants.

The Master of Computing in AI programme (MComp AI) aims to train students in advanced principles, algorithms, and applications in AI. The programme focuses on the computational fundamentals and principles that underlie intelligent systems (knowledge representations, machine learning, and reasoning) as well as the state-of-the-art technologies and business practices in major AI application domains, including computer vision, speech & language processing, data analytics, and robotics. You will also have the option to work closely with a faculty member on a year-long research-based dissertation.

SAMPLER OF MODULES

Neural Networks and Deep Learning:
Deep learning using neural networks have recently been applied to a plethora of practical problems, including computer vision, bioinformatics, finance technology, cybersecurity, natural language processing, speech recognition, and games. Learn practical data preparation techniques and apply deep neural networks to tackle real-world problems.

AI Planning and Decision Making:
How can we build a computer programme that can make its own decisions or plan its actions? Study foundational AI concepts that help programmes make the best decisions, including both deterministic and non-deterministic planning, as well as single-agent and multi-agent planning.

Theory and Algorithms for Machine Learning:
How do machine learning algorithms learn a concept from large data sets? What are their limits? Can any concepts be learned from given data sets? Develop insights on what learning is, the computational limits of learning and the foundations of popular machine learning algorithms.

Uncertainty Modelling in AI:
How is vague and incomplete information represented and reasoned with in an AI system? Pick up classical techniques to represent and reason about imperfect knowledge, and apply the models learnt to different domains such as speech, vision, and natural language processing.

Intelligent System Deployment:
How can AI systems give your company a competitive advantage? Learn about the business requirements of an AI system, how AI systems are used in businesses today, and get hands-on experience assessing, planning and deploying intelligent systems through business case assignments.

PROGRAMME STRUCTURE

Coursework Option:
Complete 10 modules, with 5 Artificial Intelligence core/elective modules

Dissertation Option:
Complete 6 modules, with at least 3 Artificial Intelligence core modules
Complete a dissertation in area of specialisation (equivalent to 4 modules)

Duration:
There are full-time and part-time study options, and you may complete the programme in 1 to 3 year(s).

INFOCOMM SECURITY

COURSE DESCRIPTION

We now live in a world where much of our private information is stored in the cloud and frequently exchanged on the Internet. Most of the services and applications that we use on our devices require Internet access to be useful. On one hand, this provides the convenience for users and organisations to interact online, anytime and anywhere. But on the other hand, the ubiquitous connectivity and networked-based services open opportunities for malicious parties to steal information, bring down services, and hold users and organisations to ransom. Information security professionals work on the front line to maintain trust among communicating devices and users, defend computing systems from malicious attacks, ensure systems and applications are securely deployed, develop and implement organisational security and privacy policies, and manage an organisation's IT risk.

IIf you have a background in computing and want to specialise in information security, the Master of Computing in Infocomm Security (MComp InfoSec) programme provides in-depth training in this area. You can choose from a large array of modules, covering the technical aspects as well as the organisational aspects of information security. You will undertake a semester-long project and can choose from either a research-based project with a faculty member or an industry-based project with an external company or agency. You can also choose to complete a dissertation, conducting research on a specific security issue and developing a solution.

SAMPLER OF MODULES

Web Security:
Poorly developed websites and web applications leave security holes that allow users private information to be stolen. This module provides a solid background on secure coding and design practices, common web browsers and applications vulnerabilities, and their interactions with the OS, cloud infrastructure and backend databases.

Information Security Policy and Management:
There can be constraints and competing priorities when managing an organisation's security policies. Learn how to determine vulnerabilities and build technical and procedural security strategies so that your organisation is resilient against threats and disruptions.

Principles and Practices of Program Analysis:
The root of many security vulnerabilities lies in inappropriately written code. Gain a deeper understanding of how programmes can be analysed to enable you to write more secure code and develop new tools to automatically find security vulnerabilities.

Network Security:
Learn about the various trickeries that malicious attackers can use to attack a computer network, and the state-of-the-art techniques that security defenders are using to guard against them.

Biometric Authentication:
Entering passwords is so passé! Wouldn't you rather have your face or fingerprint scanned for identification? Learn the risks and benefits of using these biometric-based security and develop a solid understanding of the underlying principles as well as practical issues to be considered for successful deployment.

PROGRAMME STRUCTURE

Dissertation Option:
Complete 6 modules, with at least 3 Infocomm Security specialisation modules
Complete a dissertation in area of specialisation (equivalent to 4 modules)

Project Option:
Complete 8 modules, with at least 4 Infocomm Security specialisation modules
Complete a project in area of specialisation (equivalent to 2 modules)

Duration:
There are full-time and part-time study options, and you may complete the programme in 1 to 3 year(s).

APPLICATION INFORMATION

SCHOLARSHIPS & FUNDING

SkillsFuture funding, awards and scholarships may be available to candidates who gain admission to the Master of Computing programme.

APPLICATION DETAILS

For eligibility, programme, fees, loan, admissions and application details, please visit:

www.comp.nus.edu.sg/programmes/#graduate

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