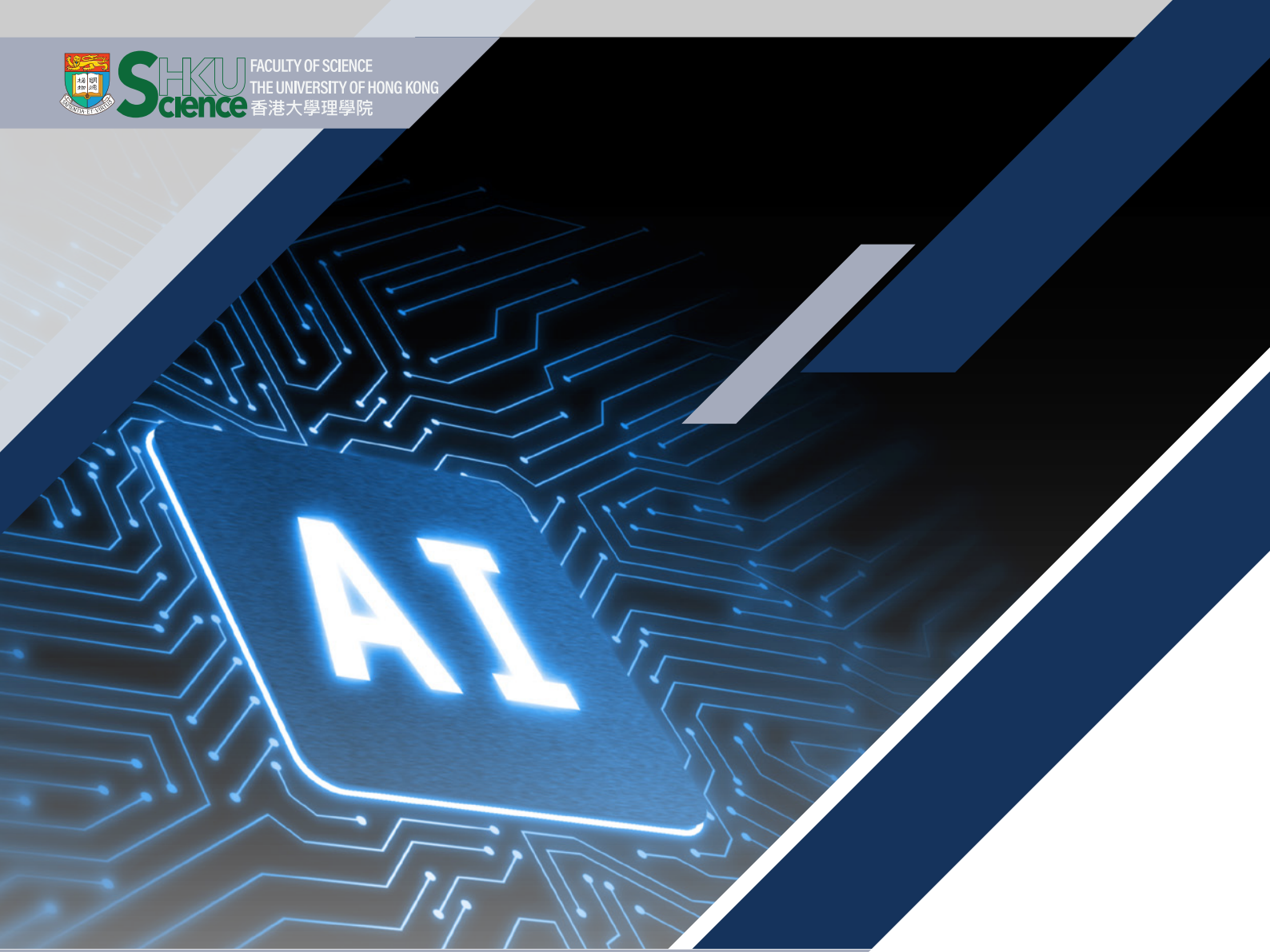




SHKU
Science

FACULTY OF SCIENCE
THE UNIVERSITY OF HONG KONG
香港大學理學院



AI

Master of Science in

ARTIFICIAL INTELLIGENCE

Nurturing talents in artificial intelligence

2027-28 (September 2027 intake)

IS THE PROGRAMME FOR YOU

In today's technologically advanced era, the indispensability of artificial intelligence (AI) in our daily lives is undeniable. With intelligent machines permeating every aspect of society, the advantages of enhanced efficiency and the augmentation of human capabilities have become apparent. One notable facet of AI is machine learning, enabling machines to observe, analyse, and even make mistakes, akin to the human brain, without explicit programming. As a result, AI has found its applications in diverse fields, including scientific research, transportation, and marketing. As we look ahead, the demand for AI professionals is expected to continue growing.

The Master of Science in Artificial Intelligence [MSc(AI)] is an interdisciplinary taught postgraduate programme jointly offered by the Department of Mathematics (host) and the School of Computing and Data Science. This programme focuses on cultivating expertise in mathematics, statistics, and computer science, intending to leverage these disciplines to empower AI in decision-making and problem-solving across various private and public sector organisations and enterprises.

World-class Rankings of HKU

Quacquarelli Symonds (QS)



#11

World Rankings 2027

#1

Asia Rankings 2026

Times Higher Education (THE)



#33

World Rankings 2026

#6

Asia Rankings 2026



U.S. News Rankings

#40

Best Global Universities 2026

Top-notch Scientists in the Faculty

Clarivate Analytics' Essential Science Indicators

20.8%

of our professoriate staff
(average over the past decade)
are classified Top 1% scholars

Interdisciplinary and well-balanced curriculum

- ◇ Solid training in diverse techniques used in AI from the core courses
- ◇ Electives over related topics from mathematics, statistics, and computer science
- ◇ A capstone project with real-life applications
- ◇ Guest lectures by distinguished scholars and industry experts
- ◇ Internship opportunities in the AI industry and academia

Learning within and beyond AI

- ◇ Students will learn the AI-related applications of mathematics, statistics, and computer science to solve real-life problems
- ◇ The theoretical elements in the curriculum will help students develop essential intellectual capacity at large

Industry connections and career prospects

- ◇ The teaching team has strong connections with high-tech industries in the Greater Bay Area
- ◇ Our graduates are expected to be well prepared for careers such as software engineers, consultants and research scientists in AI and related fields, such as big data and financial technology

Programme Information



Tuition fees

Composition fee: HK\$420,000[#] (subject to approval)

Students are required to pay Caution Money (HK\$350, refundable on graduation subject to no claims being made) and Graduation Fee (HK\$350). All full-time students will be charged a student activity fee of HK\$100 per annum to provide support for activities of student societies and campus-wide student events.



Programme duration

Full-time: 1.5 years



Medium of instruction

English



Study load

Credits: 72 credits

Learning hours: 1,440 – 2,160 hours (including 240 – 360 hours for project and contact hours of 264 – 396 hours)



Class schedule

Teaching takes place mainly on weekdays. Classes may also be arranged on Saturdays if needed.



Scholarships

- Master of Science in Artificial Intelligence Entrance Scholarship (HK\$20,000)
- Master of Science in Artificial Intelligence Outstanding Performance Scholarship (HK\$20,000 – HK\$30,000)
- Tongcheng Travel Scholarship (HK\$100,000)



Assessment

- Mainly written and programming coursework, and/or examinations
- A Capstone Project on a topic of student's choice

[#] The fee shall generally be payable in 3 instalments over 1.5 years

Where will this Programme Lead You

Transferable skills

- ◇ Equip students with the solid foundation in both theory and practice in artificial intelligence and the underlying mathematical and statistical tools
- ◇ The practical elements in the courses help students develop essential intellectual capacity and skills, including but not limited to image processing, pattern recognition, financial technology, robotics and quantum computing, and so on
- ◇ Students will learn the applications of mathematics, statistics, and computer science to decision-making and problem-solving in organisations and enterprises within the private and public sectors
- ◇ Students will be able to apply the methodologies learnt ethically and effectively in different academic or professional disciplinary areas

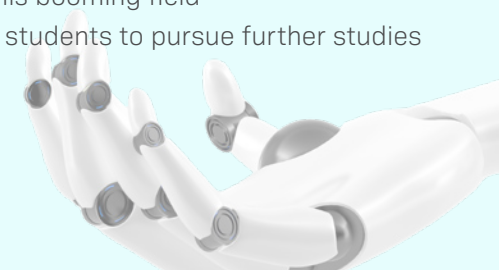
Host

Department of Mathematics

Addressing the need for talents in the field of artificial intelligence, the Department of Mathematics, in collaboration with the School of Computing and Data Science, has launched the Master of Science in Artificial Intelligence programme since 2022. We adopt an interdisciplinary academic focus to make our programme a comprehensive study of artificial intelligence.

Who should Take this Programme

- ◇ Candidates with a bachelor's degree in subjects including but not limited to mathematics, statistics, computer science, and engineering disciplines
- ◇ University graduates and young professionals who aspire to pursue a career in this booming field
- ◇ Scholastically superior students to pursue further studies in the relevant fields



Programme structure

Design of curriculum (72 credits)
Compulsory courses (42 credits)
ARIN7001 Foundations of artificial intelligence (6 credits) ARIN7011 Optimization in artificial intelligence (6 credits) ARIN7013 Numerical methods in artificial intelligence (6 credits) ARIN7101 Statistics in artificial intelligence (6 credits) ARIN7102 Applied data mining and text analytics (6 credits) COMP7404 Computational intelligence and machine learning (6 credits) DASC7606 Deep learning (6 credits)
Disciplinary electives (18 credits) with at least 6 credits from each of the following lists
List A: ARIN7014 Topics in advanced numerical analysis (6 credits) ARIN7015 Topics in artificial intelligence and machine learning (6 credits) MATH7224 Topics in advanced probability theory (6 credits) MATH7502 Topics in applied discrete mathematics (6 credits) MATH7503 Topics in advanced optimization (6 credits) List B: STAT6011 Computational statistics and Bayesian learning (6 credits) STAT7008 Programming for data science (6 credits) STAT8020 Quantitative strategies and algorithmic trading (6 credits) STAT8307 Natural language processing and text analytics (6 credits) List C: COMP7308 Introduction to unmanned systems (6 credits) COMP7309 Quantum computing and artificial intelligence (6 credits) COMP7409 Machine learning in trading and finance (6 credits) COMP7502 Image processing and computer vision (6 credits) ARIN7017 Legal issues in artificial intelligence and data science (6 credits)
Capstone project (12 credits)
ARIN7600 Artificial intelligence project (12 credits)

- Remarks:
- Students who have completed the same or similar courses in their previous studies may, on submission of relevant transcripts, be permitted to select up to 18 credits of disciplinary electives from the other two lists if they are not able to find any untaken options from any one of the lists of disciplinary electives.
 - The programme structure will be reviewed from time to time and is subject to change.

Compulsory Courses

ARIN7001 Foundations of artificial intelligence

This course introduces foundational knowledge, methods and tools in mathematics, statistics and computer science for the purpose of studying and applying artificial intelligence.

ARIN7011 Optimization in artificial intelligence

This course introduces students to the topics in theory and algorithms of optimization that play important roles in artificial intelligence and machine learning. Topics include: 1) Fundamental optimization models in AI (linear programming models, integer programming models, kernel learning and deep learning models, etc.), 2) Optimization theory in AI (optimality conditions, constraint qualification, landscape analysis of neural

networks, duality, complexity analysis, etc.), and 3) Optimization algorithms in AI: (a) Classic algorithms (simplex method, interior point method, cutting plane method, gradient type methods, projection methods, Lagrange methods, Newton type methods and Nesterov acceleration), (b) Stochastic algorithms (stochastic gradient descent (SGD), stochastic coordinate descent methods, stochastic variance reduced gradient, adaptive gradient methods, adaptive moment estimation (ADAM), etc.), (c) Algorithms for large-scale optimization problems (Operator splitting algorithms (BCD type algorithms, ADMM, primal-dual type algorithms, etc.), centralized/decentralized algorithms, etc.) and (d) Algorithms for nonconvex optimization and training deep neural networks.

ARIN7013 Numerical methods in artificial intelligence

This course introduces students to the numerical methods that are instrumental in artificial intelligence and machine learning. Topics include: 1) Supervised learning (CNN in classification, kernel methods in supervised learning, and Kernel Ridge Regression). 2) Numerical methods for solving linear systems (Gaussian elimination methods, LU factorization, Jacobi Method, Gauss-Seidel method, singular value decomposition (SVD), low-rank approximation, with applications in artificial intelligence and machine learning). 3) Principal component analysis, kernel PCA and their applications to computer vision, image processing and artificial intelligence and machine learning in general. 4) Compute eigenvalues and eigenvectors (Power/inverse/Rayleigh quotient methods, with applications in artificial intelligence and machine learning). 5) Numerical methods for ordinary differential equations and related neural network architectures (stability, convergence analysis, and neural network architectures related to ODEs, such as ResNets and Neural ODE).

ARIN7101 Statistics in artificial intelligence

The development of artificial intelligence has revolutionized the theory and practice of statistical learning, while novel statistical learning approaches are becoming an integral part of artificial intelligence. By focusing on the interplay between statistical learning



and artificial intelligence, this course reviews the main concepts underpinning classical statistical learning, studies computer-intensive methods for conducting statistical learning, and examines important issues concerning statistical learning drawn upon modern artificial intelligence technologies. Contents include classical frequentist and Bayesian inferences, variational inference, latent variable model, regularization, introduction on Markov chain and Markov decision process, and fundamental reinforcement learning.

ARIN7102 Applied data mining and text analytics

With the rapid developments in computer and data storage technologies, the fundamental paradigms of classical data analysis are mature for change. Data mining aims at automated discovery of underlying structure and patterns in large amounts of data, especially text data. This course takes a practical approach to acquaint students with the new generation of data mining tools and techniques, and shows how to use them to make informed decisions. Topics include data preparation, feature selection, association rules, decision trees, bagging, random forests and gradient boosting, cluster analysis, neural networks, and introduction to text mining.

COMP7404 Computational intelligence and machine learning

This course will teach a broad set of principles and tools that will provide the mathematical, algorithmic, and philosophical framework for tackling problems using Artificial Intelligence (AI) and Machine Learning

WHAT YOU WILL LEARN

(ML). AI and ML are highly interdisciplinary fields with impact in different applications, such as biology, robotics, language, economics, and computer science. AI is the science and engineering of making intelligent machines, especially intelligent computer programmes, while ML refers to the changes in systems that perform tasks associated with AI. Ethical issues in advanced AI and how to prevent learning algorithms from acquiring morally undesirable biases will be covered. Topics may include a subset of the following: problem solving by search, heuristic (informed) search, constraint satisfaction, games, knowledge-based agents, supervised learning (e.g., regression and support vector machine), unsupervised learning (e.g., clustering), dimension reduction learning theory, reinforcement learning, transfer learning and adaptive control, and ethical challenges of AI and ML.

DASC7606 Deep learning

Machine learning is a fast-growing field in computer science and deep learning is the cutting-edge technology that enables machines to learn from large-scale and complex datasets. Ethical implications of deep learning and its applications will be covered, and the course will focus on how deep neural networks are applied to solve a wide range of problems in areas such as natural language processing and image processing. Other applications such as financial predictions, game playing, and robotics may also be covered. Topics covered include linear and logistic regression, artificial neural networks and how to train them, recurrent neural networks, convolutional neural networks, generative models, deep reinforcement learning, and unsupervised feature learning.

Disciplinary Electives

ARIN7014 Topics in advanced numerical analysis

This course delves into advanced topics in numerical analysis, providing students with a comprehensive understanding of key concepts and methods. The course covers a diverse range of topics that include: 1) Numerical methods for linear algebra, such as QR method, Krylov subspace methods, the generalized minimal residual method (GMRES), robust PCA, and dimensionality reduction methods; 2) Numerical methods for partial differential equations, including both traditional numerical methods and deep learning-based methods; 3) Stochastic computational methods,

such as the Monte Carlo method and its variants (e.g. the quasi-Monte Carlo method and the multilevel Monte Carlo method), and their applications in financial mathematics, artificial intelligence, and machine learning; 4) Fourier analysis, approximation theory, and high-dimensional approximation in the context of deep learning. The specific topics covered in the course may be subject to annual changes to ensure that students receive the most up-to-date and relevant instruction.

ARIN7015 Topics in artificial intelligence and machine learning

The course introduces selected topics in the theory and algorithms that are fundamental in artificial intelligence and machine learning. Topics include statistical learning theory (generalization gap, risk decomposition, concentration inequalities, uniform convergence, model complexities, and Vapnik–Chervonenkis theory), stochastic optimization for machine learning (minibatch SGD, Frank-Wolfe algorithm, convergence analysis, implicit bias and early stopping), algorithmic stability (basic convex analysis, regularization schemes, stability analysis of stochastic optimization algorithms and excess risk analysis).

MATH7224 Topics in advanced probability theory

Selected topics in probability theory will be discussed in this course.

MATH7502 Topics in applied discrete mathematics

This course aims to provide students with the opportunity to study some further topics in applied discrete mathematics. A selection of topics in discrete mathematics applied in combinatorics and optimization (such as algebraic coding theory, cryptography, discrete optimization, etc.) will be covered. The selected topics may vary from year to year.

MATH7503 Topics in advanced optimization

A study in greater depth of some special topics in mathematical programming or optimization. It is mainly intended for students in Operations Research or related subject areas. This course covers a selection of topics which may include convex programming, nonconvex programming, saddle point problems, variational inequalities, optimization theory, and algorithms suitable for applications in various areas such as machine learning, artificial intelligence, imaging, and computer vision. The selected topics may vary from year to year.

STAT6011 Computational statistics and Bayesian learning

This course aims to give students an introduction to modern computationally intensive methods in statistics, with a strong focus on Bayesian methods. The role of computation as a fundamental tool in data analysis and statistical inference will be emphasized. The course will introduce topics including the generation of random variables, optimization techniques, and numerical integration using quadrature and Monte Carlo methods. This course will then cover the fundamental Bayesian framework, including prior elicitation, posterior inference, and model selection. For posterior computation, Monte Carlo methods such as importance sampling and Markov chain Monte Carlo will be introduced. Methods for approximate inference such as variational Bayes will also be covered. Advanced Bayesian modelling with nonparametric Bayes will then be explored, with applications in machine learning. This course is particularly suitable for students who intend to pursue further studies or a career in research.

STAT7008 Programming for data science

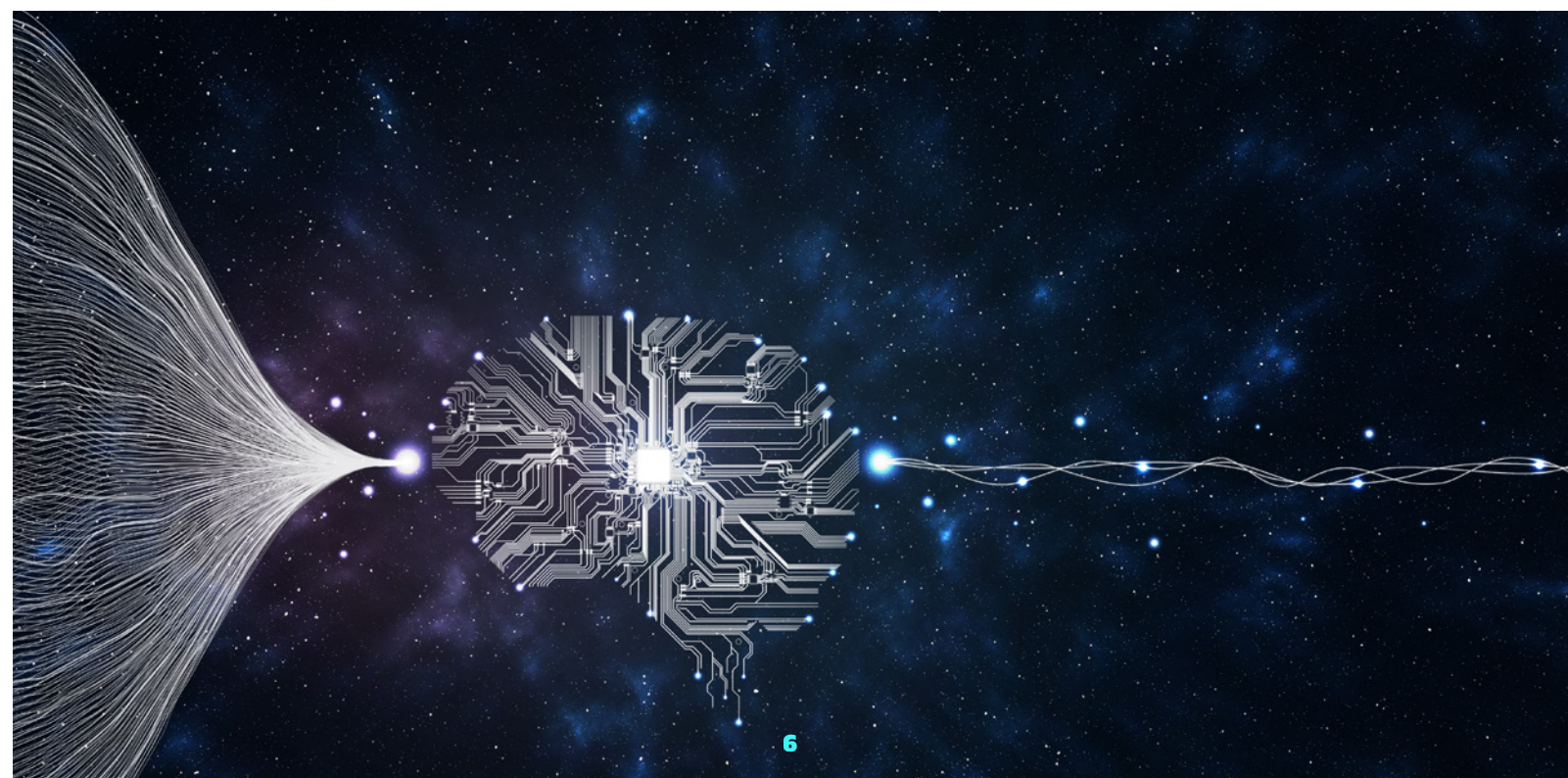
Capturing and utilizing essential information from big datasets poses both statistical and programming challenges. This course is designed to equip students with the fundamental computing skills required to use Python for addressing these challenges. The course will cover a range of topics, including programming syntax, files IO, object-oriented programming, scientific data processing and analysis, data visualization, data

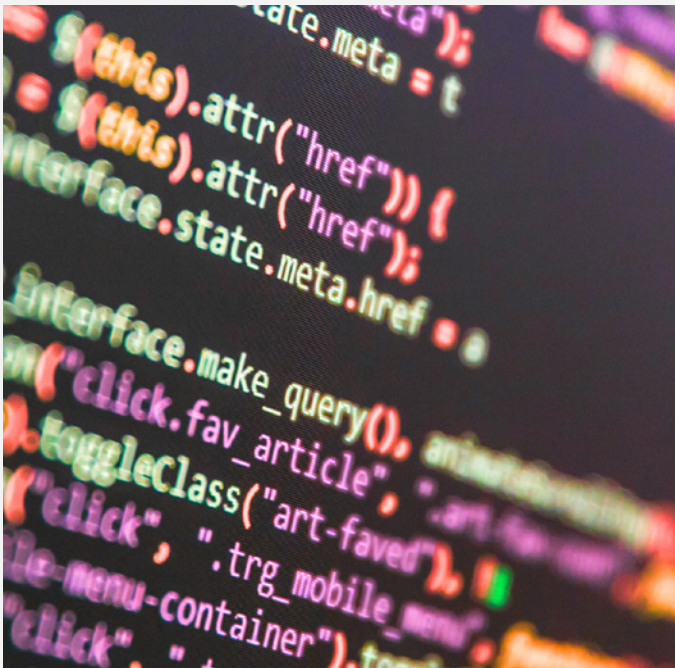
mining and web scraping, programming techniques for machine learning, deep learning, computer vision, and natural language processing, etc.

STAT8020 Quantitative strategies and algorithmic trading

Quantitative trading is a systematic investment approach that consists of the identification of trading opportunities via statistical data analysis and implementation via computer algorithms. This course introduces various methodologies that are commonly employed in quantitative trading.

The first half of the course focuses on strategies and methodologies derived from the data snapshot at daily or minute frequency. Some specific topics are: (1) techniques for trading trending and mean-reverting instruments, (2) statistical arbitrage and pairs trading, (3) detection of “time-series” mean reversion or stationarity, (4) cross-sectional momentum and contrarian strategies, (5) back-testing methodologies and corresponding performance measures, and (6) Kelly formula, money and risk management. The second half of the course discusses statistical models of high-frequency data and related trading strategies. Topics that are planned to be covered include: (7) introduction to market microstructure, (8) stylized features and models of high-frequency transaction prices, (9) limit order book models, (10) optimal execution and smart order routing algorithms, and (11) regulation and compliance issues in algorithmic trading.





STAT8307 Natural language processing and text analytics

Natural Language Processing (NLP) is a core area of artificial intelligence and data science that focuses on enabling machines to understand, process, and generate human language. This course introduces fundamental NLP techniques and text analytics methods, covering topics such as information retrieval, text classification, word embeddings, neural networks, sequence models, encoder-decoder architectures, transformers, contextualized word representations, and modern language models. The course also emphasizes practical applications and hands-on experience in analyzing textual data. Proficiency in Python programming is required.

COMP7308 Introduction to unmanned systems

This course aims to study the theory and algorithms in unmanned systems. Topics include vehicle modeling, vehicle control, state estimation, perception and mapping, motion planning, and deep learning-related techniques.

COMP7309 Quantum computing and artificial intelligence

This course offers a theoretical overview of selected topics from the interdisciplinary fields of quantum computation and quantum AI. The scope of the lectures encompasses an accessible introduction to the fundamental concepts of quantum computation. Importantly, the introduction does not require preliminary knowledge of quantum theory. Detailed comparisons of computational principles and related phenomena in the

classical and quantum domains outline the potential and challenges of quantum theory for fundamentally novel algorithms with enhanced processing power. The theoretical capability of quantum computers is illustrated by analyzing a selection of milestone algorithms in quantum computation and their potential applications to artificial intelligence and optimization.

COMP7409 Machine learning in trading and finance

The course introduces students to the field of Machine Learning (ML) and helps them develop skills in applying ML, or more precisely, applying supervised learning, unsupervised learning and reinforcement learning to solve problems in Trading and Finance. This course will cover the following topics: (1) Overview of ML and AI (2) Supervised Learning, Unsupervised Learning, and Reinforcement Learning; (3) Major algorithms for Supervised Learning and Unsupervised Learning with applications to Trading and Finance; (4) Basic algorithms for Reinforcement Learning with applications to optimal trading, asset management, and portfolio optimization; (5) Advanced methods of Reinforcement Learning with applications to high-frequency trading, cryptocurrency trading, and peer-to-peer lending.

COMP7502 Image processing and computer vision

This course explores the theory and algorithms of image processing and computer vision. Topics include image representation, image enhancement, image restoration, mathematical morphology, image compression, scene understanding, and motion analysis.



ARIN7017 Legal issues in artificial intelligence and data science

This course introduces students to the growing legal, ethical, and policy issues associated with artificial intelligence, data science, and the related issues of security and assurance. In particular, the relationship of AI and data science to personal autonomy, information assurance and privacy is analyzed, and legislative responses are studied. Class participation, research, writing, and oral/electronic presentations are integral components of the course. The course contributes to the following goals: written communication and life-long learning, problem analysis, problem-solving, and teamwork.

Capstone Project

ARIN7600 Artificial intelligence project

Students will be expected to carry out independent work on a research project under the supervision of faculty members. A written report and an oral presentation on the research are required.

More course information at:

<https://www.scifac.hku.hk/prospective/tpg/ArtificialIntelligence>



Hear from our graduates

Lan LOU
MSc(AI) Graduate 2026

“AI is no longer simply a field of study but is becoming one of the defining forces of our time. As many worry about losing clarity amid the speed and hype of the AI revolution, the MSc (AI) programme has provided us with the theoretical foundation, practical skills, and critical judgment to navigate this change with confidence, allowing us to become thoughtful practitioners who understand and shape AI, rather than passive bystanders swept along by its tide. Though brief, these one and a half years may serve as a gateway to industry or a launchpad for further academic pursuit. More than a degree, the programme shall equip us with the curiosity, capability, and sense of purpose to move beyond campus, engage with the wider world, and help build the future ahead.”

Lexiao CHEN
MSc(AI) Graduate 2025

“HKU’s MSc(AI) bridges rigorous theory with hands-on engineering. Core modules in optimisation, numerical methods, statistics, deep learning, and computational intelligence strengthened my grasp of trainability, generalisation, and evaluation, while electives and seminars opened RAG, LLM fine-tuning, and vector search. Under close faculty guidance, the capstone produced a practical LLM-powered RAG system covering data governance, retrieval quality, reranking, alignment, and automated evaluation. That mentorship directly improved my problem framing, metric design and review, and gave me reproducible, safety-first habits that now anchor my engineering work. This blend of fundamentals, mentorship, and real projects made the transition to my current role as an AI Large Language Model Algorithm Engineer at Alibaba smooth. I recommend the programme to candidates seeking depth, clarity, and results.”

Yicheng FU
MSc(AI) Graduate 2024

“Enrolling in the Master of Science in Artificial Intelligence programme at HKU has been transformative for my future career aspirations. The programme’s unique strength lies in its diverse faculty members from Mathematics, Statistics & Actuarial Science, and Computer Science backgrounds, offering a rich pool of expertise for further research opportunities. The collaborative environment created by these professors has opened doors for engaging in cutting-edge research projects, enriching my understanding of AI. Moreover, HKU’s AI programme goes beyond academia by organising a myriad of career events that cater to both research and industry pathways. From hosting finance giants like Goldman Sachs to tech powerhouses like Huawei, these events provide invaluable networking opportunities and insights into various career avenues. This exposure has not only broadened my horizons but has also equipped me with the necessary skills and connections to thrive in the dynamic world of AI. I am grateful for the holistic approach of the HKU AI programme, which not only nurtures academic excellence but also fosters a supportive environment for professional growth and development.”



“Tapping into the AI expertise of our teaching team, we set out to nurture talents who will be geared up to meet the mounting demand for AI professionals both in Hong Kong and worldwide.”

Programme Director
Professor Xiaoming YUAN
BSc, MPhil Nanjing; PhD CityU

Academic staff

Department of Mathematics

Professor W K CHING	BSc, MPhil HKU; PhD CUHK
Professor G HAN	BSc, MSc Peking; PhD Notre Dame
Professor B KANE	BSc, MSc Carnegie Mellon; PhD Wisconsin
Professor L LAI	BSc HKU; PhD Columbia
Professor Y LEI	BSc Hunan; PhD Wuhan
Professor D LI	BSc HKBU; PhD Princeton
Professor G LI	MS Fudan; PhD Texas A&M
Professor A SUZUKI	BEng, MSc, PhD Tokyo
Professor X YUAN	BSc, MPhil Nanjing; PhD CityU
Professor W ZANG	BSc NUDT; MSc Academia Sinica; PhD Rutgers
Professor Z ZHANG	BS, PhD Tsinghua

School of Computing and Data Science

Mr H Y Y CHEUNG	BSc UCL; MSc Imperial College London
Professor F Y L CHIN	BASc Toronto; MSc, MA, PhD Princeton
Dr D EBLER	BSc(Eng), MSc ETH; PhD HK
Professor S H GAO	PhD NTU
Dr E A L LI	BSc HKU; MEcon, PhD Sydney
Professor M M LOSAVIO	BS Mathematics, JD LSU
Professor J PAN	PhD UNC-Chapel Hill
Professor D SCHNIEDERS	PhD HKU
Dr H F TING	PhD Princeton
Professor K K Y WONG	BEng CUHK; MPhil, PhD Cambridge
Professor G S YIN	MA Temple; MSc, PhD UNC
Professor L Q YU	BEng ZJU; PhD CUHK
Dr C Y ZHANG	PhD HKU

Admissions

Requirements

- ◇ A Bachelor’s degree or an equivalent qualification;
- ◇ Applicants should possess knowledge of linear algebra, calculus, probability theory, introductory statistics, and computer programming; and
- ◇ Fulfil the University Entrance Requirements.

How to apply

Application deadlines:
Main round: **12:00 noon (GMT +8), November 16, 2026**
Candidates who apply within main round will have priority for admission

Clearing round: **12:00 noon (GMT +8), February 1, 2027**

Online application:
t.ly/Tkcyo



Expected degree conferment will take place in

July 2029 (Summer Congregation)

Further Information

Programme details



www.mscai.hku.hk

Support for students



www.cedars.hku.hk

Enquiries

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Faculty of Science

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🏠 www.scifac.hku.hk/

