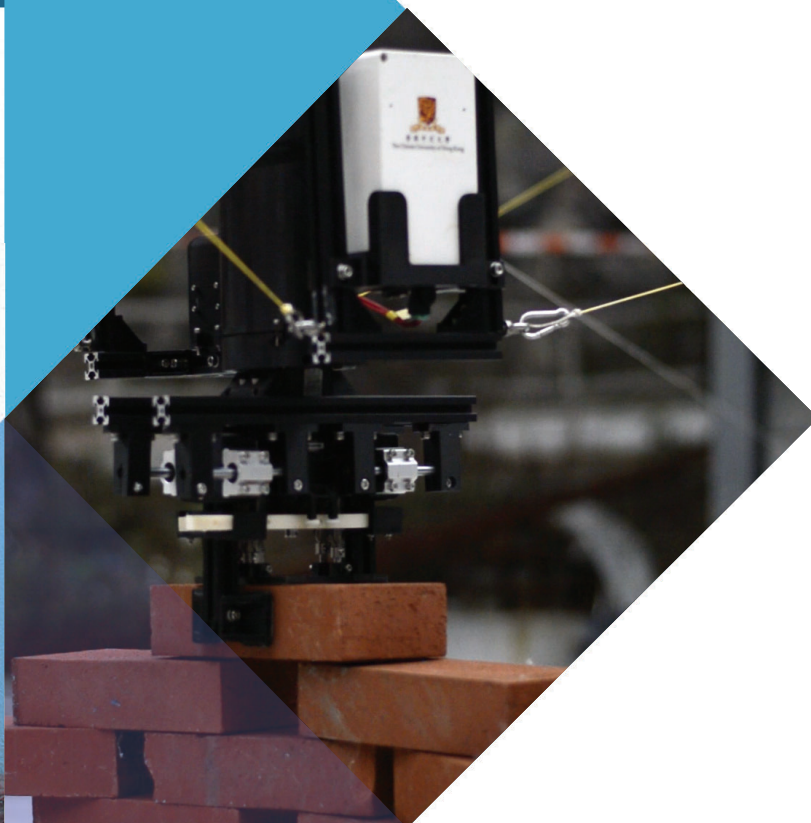




# **Mechanical and Automation Engineering**

**JUPAS Code: JS4408**



**Department of Mechanical and Automation Engineering  
The Chinese University of Hong Kong**



# Foreword

## **Engineering creates Real Value for the society**

Engineering is not about passing goods or dollars from one hand to another and making profit out of the process. Engineering is about creating real value for the society. It is the pursuit of science for direct benefit of mankind, creating a better and safer world for humans. It encompasses turning natural materials to bridges and optical fiber and robots, and transforming sunlight and wind and waterfalls to power sources. The world would be an entirely different one without engineering innovations. It must be noted that engineering is beyond mere application of science. Almost every task in engineering, be it building a robot that can walk on two legs, or turning waterfall into energy source, is about a problem that does not come from nature but exists only after the task is spelled out, whose solution demands both innovation and deep analysis. Engineering is both application and furtherment of science.

## **Engineering Education is for Engineering career, and beyond**

Engineering training is not just about preparing engineers for the society. The training has a great deal to do with abstracting real-life problems to bare bone form, relating the problems to scientific and mathematical tools by so doing, arriving at solutions that can withstand uncertainties and disturbances in the real world, and designing proper human interface to ensure ease of use. A problem-solving approach like this has tremendous value in many sectors of the society. Numerous prominent corporate executives, technical consultants, entrepreneurs came from engineering background. A solid engineering education opens the door to many career options beyond engineering.

## **The MAE Discipline focuses on Modern Engineering**

The **Mechanical and Automation Engineering (MAE)** Department of CUHK aims at offering solid education and cutting-edge research opportunities around two aspects of engineering: (1) the proper physical interaction of engineering systems with the physical world through force, heat, and energy (and hence the word "*Mechanical*" in the department name); and (2) the self-operability of the systems demanding minimum intervention from humans (and hence the word "*Automation*").

The physical interaction of engineering innovations with the world is important because Engineering is, after all, about restructuring the environment for human convenience and safety. MAE seeks to design and control such interaction based upon fundamental knowledge on rigid body mechanics, fluid mechanics, thermodynamics, and conservation of mass and energy.

It is also desired that engineering systems do not just do what is instructed but exhibit certain degree of autonomy in their operations. To achieve that, MAE seeks to use tactile, force, range, temperature, and other sensors to measure system performance, link system performance to system input, and design intelligent algorithms for making fast and right decisions.

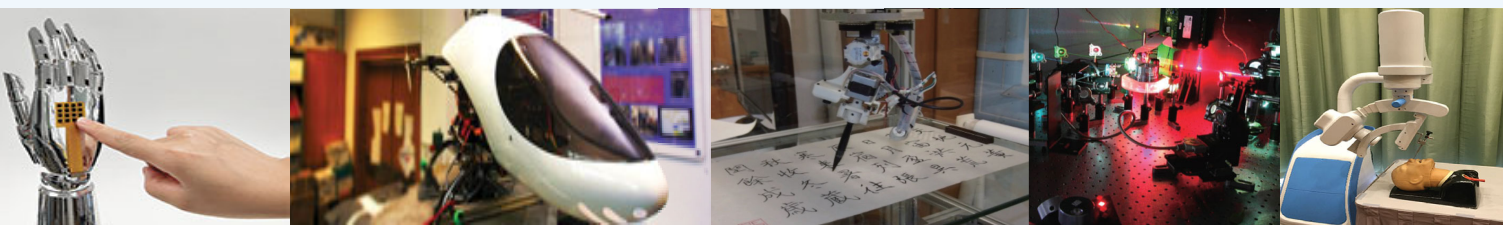
The aspects form the core of modern engineering. Knowhow on such aspects allows engineers to reach far in their innovations.

Accredited by the Hong Kong Institution of Engineers (HKIE), the programme is known for its good design and quality teaching.

## **MAE welcomes You**

We invite you to browse through our website <<http://www.mae.cuhk.edu.hk>> to learn more about the Department, the professors, the academic programmes, and the researches.

We welcome anyone with a "heart" on engineering to join us pursue the exciting opportunities in MAE.





# Programme Curriculum

## Year 1

### Faculty Package

ENGG1110 Problem Solving By Programming  
ENGG1111 AI Literacy Workshop (0 unit)  
ENGG1120 Linear Algebra for Engineers  
ENGG1125 Single Variable Calculus for Engineers

### Foundation Courses

ENGG1130 Multivariable Calculus for Engineers  
MAEG1020 Computational Design and Fabrication  
PHYS1110 Engineering Physics: Mechanics and Thermodynamics

### University Core Requirements

English (3 units), Chinese (3 units), College GE (3 units),  
Foundation GE (3 units), DL&CT-R (3 units), PE (2 units),  
Understanding China (0-1 unit) &  
Hong Kong in the Wider Constitutional Order (0-1 unit)

## Year 2

### Foundation Courses

ENGG2720 Complex Variables for Engineers (2 units)  
ENGG2740 Differential Equations for Engineers (2 units)

### Major Required Courses

EEEN3030 Engineering Materials  
ELEG2202 Fundamentals of Electric Circuits  
MAEG2020 Engineering Mechanics  
MAEG2030 Thermodynamics  
MAEG2601 Technology, Society and Engineering Practice (2 units)

### Major Elective

\*\*Breadth Elective (0-3 units)

### University Core Requirements

English (3 units), Chinese (2 units), Foundation GE (3 units),  
Other GE (2 units), Understanding China (0-1 unit) &  
Hong Kong in the Wider Constitutional Order (0-1 unit)

MAEG2602 Engineering Practicum (1 unit)  
(5 weeks)

## Year 3

### Major Required Courses

MAEG3010 Mechanics of Materials  
MAEG3020 Manufacturing Technology  
MAEG3030 Fluid Mechanics  
MAEG3040 Mechanical Design  
MAEG3050 Introduction to Control Systems

### Major Electives

\*\*Breadth or Depth Electives (3-9 units)

### University Core Requirements

English (2 units), College GE (3 units) & Other GE (3 units)

## Year 4

### Major Required Courses

MAEG4030 Heat Transfer  
MAEG4998 Final Year Project I  
MAEG4999 Final Year Project II

### Major Electives

\*\*Breadth or Depth Electives (3-9 units)

### University Core Requirements

Other GE (2 units)

Unless otherwise specified, all are 3-unit courses.

\*\* For Major Electives, at least 6 units of MAEG courses at 4000 and above level or their reciprocal ESTR courses or ENGG courses at 5000 level are required.

(B) - Breadth Electives (at least 6 units are required)

(C) - Compulsory Courses in specific streams

(D) - Depth Electives (at least 6 units are required)

(E) - Electives in specific streams

~ Students can take either DOTE1030 or SEEM2440 but not both.

To qualify for a stream, students must complete a minimum of 12 units taken under the stream.

## Major Electives

### Design and Manufacturing Stream

(B) / (C) CSCI1020 Hands-on Introduction to C++ (1 unit)  
(B) / (E) ENGG5404 Micromachining and Microelectromechanical Systems  
(D) / (E) ENGG5405 Theory of Engineering Design  
(B) / (E) MAEG2050 Robot Development in Practice: From Design to Prototyping  
(B) / (E) MAEG3060 Introduction to Robotics  
(B) / (E) MAEG3070 Fundamentals of Computer-Aided Design  
(B) / (E) MAEG3080 Fundamentals of Machine Intelligence  
(B) / (E) MAEG3920 Engineering Design and Applications  
(D) / (E) MAEG4010 Computer-Integrated Manufacturing  
(D) / (E) MAEG4020 Finite Element Modelling and Analysis  
(D) / (E) MAEG4060 Virtual Reality Systems and Applications  
(D) / (E) MAEG4070 Engineering Optimization  
(D) / (E) MAEG5030 Geometric Computing for Design and Manufacturing  
(B) / (E) MAEG5120 Nanomaterials and Nanotechnology: Fundamentals and Applications  
(B) / (E) MAEG5130 Computational Mechanics  
(B) / (E) MAEG5160 Design for Additive Manufacturing  
(B) / (E) SEEM3500 Quality Control and Management

### Mechatronics Stream

(B) / (C) CSCI1020 Hands-on Introduction to C++ (1 unit)  
(C) / (D) MAEG4040 Mechatronic Systems  
(C) / (D) MAEG4050 Modern Control Systems Analysis and Design  
(B) / (E) ELEG3701 Embedded Systems Design  
(B) / (E) ENGG2020 Digital Logic and Systems  
(B) / (E) ENGG5404 Micromachining and Microelectromechanical Systems  
(B) / (E) MAEG2050 Robot Development in Practice: From Design to Prototyping  
(B) / (E) MAEG3080 Fundamentals of Machine Intelligence  
(B) / (E) MAEG5080 Smart Materials and Structures

### Robotics and Automation Stream

(B) / (C) CSCI1020 Hands-on Introduction to C++ (1 unit)  
(B) / (C) MAEG3060 Introduction to Robotics  
(C) / (D) MAEG4050 Modern Control Systems Analysis and Design  
(B) / (E) BMEG3420 Medical Robotics  
(D) / (E) ENGG5402 Advanced Robotics  
(D) / (E) ENGG5403 Linear System Theory and Design  
(B) / (E) ENGG5404 Micromachining and Microelectromechanical Systems  
(B) / (E) MAEG1010 Introduction to Robot Design  
(B) / (E) MAEG2050 Robot Development in Practice: From Design to Prototyping  
(D) / (E) MAEG4010 Computer-Integrated Manufacturing  
(D) / (E) MAEG5090 Topics in Robotics  
(B) / (E) MAEG5120 Nanomaterials and Nanotechnology: Fundamentals and Applications

### Others

(B) CSCI2040 Introduction to Python (2 units)  
(B) CSCI2100 Data Structures  
(B) CSCI3170 Introduction to Database Systems  
(B) ~DOTE1030 Economics for Business Studies I  
(B) EEEN2020 Renewable Energy Technologies  
(D) EEEN4010 Kinetic Energy Harvesting Devices and Systems  
(D) EEEN4020 Solar Energy and Photovoltaic Technology  
(D) EEEN4030 Nuclear Energy and Risk Assessment  
(D) EEEN4050 Energy Storage Devices and Systems  
(D) EEEN4060 Energy Distribution  
(B) ENGG1820 Engineering Internship (1 unit)  
(B) ENGG2760 Probability for Engineers (2 units)  
(B) ENGG2780 Statistics for Engineers (2 units)  
(D) MAEG4080 Introduction to Combustion  
(D) MAEG5060 Computational Intelligence  
(D) MAEG5070 Nonlinear Control Systems  
(D) MAEG5110 Quantum Control and Quantum Information  
(B) MAEG5140 Materials Characterization Techniques  
(D) MAEG5150 Advanced Heat Transfer and Fluid Mechanics  
(B) MGNT1010 Introduction to Business  
(B) MGNT4090 Technology and Innovation Management  
(B) ~SEEM2440 Engineering Economics  
(B) SEEM3450 Engineering Innovation and Entrepreneurship  
(B) SEEM3490 Information Systems Management

## Summary

|                                                           | Units      |
|-----------------------------------------------------------|------------|
| <b>University Core Requirements (39 units):</b>           |            |
| - General Education (College/Foundation/Others)           | 19         |
| - Languages (English & Chinese)                           | 13         |
| - Understanding China                                     | 1          |
| - Hong Kong in the Wider Constitutional Order             | 1          |
| - Digital Literacy and Computational Thinking-R (DL&CT-R) | 3          |
| - Physical Education                                      | 2          |
| <b>Major Requirements (75 units):</b>                     |            |
| - Faculty Package                                         | 9          |
| - Foundation Courses                                      | 13         |
| - Required Courses                                        | 33         |
| - Elective Courses ** (Breadth & Depth)                   | 14         |
| - Final Year Projects                                     | 6          |
| <b>Free Electives (9 units)</b>                           | 9          |
| <b>Total</b>                                              | <b>123</b> |

The course list above is subject to curriculum changes. For fulfillment of graduation after admission, please refer to Undergraduate Student Handbook available at Academic and Quality Section Registry website: <http://www.aqs.cuhk.edu.hk>. Updated information will also be uploaded to MAE Department website: <http://www.mae.cuhk.edu.hk>.

## MAE Scholarship

### Industrial Scholarship

With the generous donations from a number of industrial companies, many industrial scholarships are set up specifically for MAE students.

## Internship and Student Exchange Programme

MAE students could opt for summer internship, work-study, or international student exchange programme. The in-field training helps prepare students to be the next generation professional engineers.

## Career Prospects

Upon graduation, MAE students will find career opportunities as mechanical engineers, production engineers, control engineers, design engineers, process engineers, maintenance engineers, systems managers, and other professions. They can also pursue postgraduate studies at local or overseas universities.

## MAE Alumni

### LAM Hiu Fung, Alan (BEng 1999, MPhil 2001 & PhD 2004) Group Chairman, Sengital Limited

Ir Prof Alan Lam, JP is currently serving MAE, CUHK as Adjunct Professor and Coordinator for Alumni and Industry Relations, supervising PhD research, and teaching AI and IoT technologies as well as startup courses. He actively and continuously participates in various professional and public services in the innovation and technology industry. In 2004, he founded Sengital Limited (current Group Chairman) and he has led the company to win dozens of technology awards and related patents. In addition, he started angel investment in 2014, and joined Gravity Capital Partners Co Ltd in 2021 and now is CEO.

Prof. Lam is a member of Innovation and Technology Fund Vetting Committee, approving grants for more than 15 years. He is HKIE END Exco member and IEEE HK Chapter Exco member. He is currently the Chairman of LSCM R&D Centre and HK Academy of Gifted Education.

Prof. Lam was selected as one of the Ten Outstanding Young Persons by the Junior Chamber International Hong Kong (JCIIHK) in 2015 and was appointed as Justice of the Peace by the Chief Executive in 2023.



### KWOK Tsz Ho (BEng 2009 & PhD 2013) University Research Chair (Tier II) & Associate Professor at Concordia University (Montreal, Canada)

My studies at CUHK's MAE Department were a transformative experience that laid a strong foundation for my academic and professional journey. The MAEG programme is distinguished by its integration of rigorous theoretical training with hands-on practice, creativity, and interdisciplinary problem-solving. Supported by a nurturing environment and mentorship from world-class faculty, I developed the skills and confidence to excel in research and innovation. The comprehensive training I received enabled me to earn prestigious recognitions, including the 8th Chinese Youth Science and Technology Innovation Prize and the Microsoft Research Fellowship Nomination Award during my time at CUHK. More importantly, the programme instilled in me the vision, resilience, and curiosity to pursue meaningful challenges. Today, as a Research Chair and Associate Professor at Concordia University in Montreal, the values and knowledge cultivated at CUHK remain central to my career. I also warmly welcome MAE students to Montreal for internships or further studies.

### LEE Ka Ki, Karen (BEng 2023) Graduate Engineer, Airport Authority Hong Kong

The MAEG programme provides a comprehensive curriculum that integrates mechanical engineering with automation technologies. This approach encourages an interdisciplinary mindset, training me to combine knowledge and skills from diverse fields such as electronics, computer science, and materials science. A key strength of the programme is the emphasis on hands-on projects and industry training. These practical learning experiences have enhanced my problem-solving abilities and equipped me with the skills needed to tackle real-world engineering challenges. The programme has prepared me for a graduate job at the Airport Authority. My previous learning on control systems, programmable logic controllers, sensors, and actuators has boosted my understanding of the design, installation, and maintenance of the mission-critical automated systems in the airport. This blend of theoretical knowledge and practical application has built a solid foundation for my career in engineering.



### MA Siu To, Herman (BEng 2024) Graduate Engineer, Cathay Pacific Airways

The thing I loved most about studying MAEG at CUHK was the freedom to choose subjects and shape my own learning path. The wide range of courses helped me build a strong foundation across different fields, which really gave me an edge when applying for graduate roles in various disciplines. I also appreciated how hands-on the programme was—especially in senior-year courses and my final year project. That experience gave me the confidence to handle practical work, which is now a big part of my job as an operational graduate engineer. In a world that's constantly changing, I think the adaptability and flexibility the MAEG programme offers are more valuable than ever.

## Admissions

For details of the admission information, please refer to the MAE Department website: <http://www.mae.cuhk.edu.hk> or the Office of Admissions and Financial Aid website: <https://admission.cuhk.edu.hk>.

### Enquiry

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