Department of Mechanical and Energy Engineering

Program of Robotics Engineering for International Students (2021)

I. Introduction

Robotics Engineering is an interdisciplinary program that integrates the learning of mechanical, electronic and computer technologies. The aim of the program is to cultivate leading talents with solid scientific foundation, excellent innovative practical ability and broad international vision, who are good at comprehensive application of theories and methods of robotics and related disciplines, and who can solve engineering problems with the latest scientific development for the future. In terms of research, its directions cover industrial robots, robot software, bionic robots, medical robots, field robots, microrobots and emerging frontier areas of science and technology such as artificial intelligence, autonomous system, service future demand for the forefront of technology and basic industries, supporting the national economic development plan and Shenzhen's local informatization, intellectualization and manufacturing comprehensive upgrade a long-term positive impact.

II. Objectives and Learning Outcomes

This program bases its objectives on the future development of robotics engineering and serves the human resource demand of the field in the background of the national mid and long term development planning. The program is committed to fostering students with a solid scientific foundation, excellent innovation capacity, broad international vision, integrated use of robotics theories and related disciplines, and skills of solving the engineering problems for the future with the latest science development.

Graduates of the program will be equipped with the following knowledge, capability, and accomplishment.

1. Solid and broad basic theoretical knowledge (including mathematics, physics, machinery, automation, electronics, computer, etc.), as well as subject knowledge in robot engineering.
2. Master the robotics theories, research and engineering design methods of robot engineering, and have a good knowledge of engineering technology and frontier development of the industry. Robotics Engineering is a multidisciplinary and interdisciplinary program and foster its students to become leading cross-disciplinary talents for the future.
3. Develop students with rigorous and practical attitude toward science and research, engagement in pursuing excellence, a strong sense of social responsibility and mission, and good communication skills.
4. Develop students with innovative thinking and the ability to independently identify,

understand and solve problems in the real world with the application of robotics via the learning of the program.

5. Develop the international outlook and skills of communication and collaboration with international professionals of the related industry.

III. Study Length and Graduation Requirements

Study length: 4 years

Degree conferred: Bachelor of Science for students fulfilling the requirements of the undergraduate program.

The minimum credit requirement for graduation: 130 credits (not including English courses);

Category	Module	Minimum Credit Requirement
General Education (GE) Required Courses (48 credits)	Science	28
	Physical Education	4
	Chinese Languages & Culture	16
General Education (GE) Elective Courses (16 credits)	Humanities	4
	Social Sciences	4
	Arts	2
	Science	6
Major Course (66 credits)	Major Foundational Courses	26
	Major Core Courses	12
	Major Elective Courses	15
	Internship and Undergraduate Thesis / Projects	13
Total (not including English courses)		130

IV. Discipline

Robotics Engineering (080803T)

V. Main Courses

Fundamental Courses of Engineering: Fundamentals of Electric Circuits, CAD and Engineering Drawing,, Engineering Mechanics I – B, Mechanics of Materials, Signals and Systems, Probability and Statistics, Fundamentals of Control Engineering, etc.

Core Courses of Robotics Engineering: Fundamentals of Machine Design, Robot Modeling and Control, Actuation System for Robotics, Sensors and Actuators, Pattern Recognition, Machine Learning, Artificial Intelligence, Mechatronic Systems, etc.

Special Courses of Robotics Engineering: Microrobotics, Walking Robot, Soft Robot, Collaborative Robot Learning, Microfabrication and Microsystems, Autonomous Robotic Systems, etc.

VI. Practice-Based Courses

Engineering Training, Experiments, Course Projects, Practice I & II, Innovation and

Entrepreneurship, Senior Project, etc.

VII. Pre-requisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of First Year	MA101B	Calculus I A	NA
	MA102B	Calculus II A	MA101B
	PHY103B	General Physics B (I)	NA
	PHY105B	General Physics B (II)	PHY103B
	MA107A	Linear Algebra A*	NA
	CS102B	Introduction to Computer Programming B*	NA
	CH101B	General Chemistry B*	NA
	Notes: 1. At least one of those four courses (marked with *) should be passed. 2. The above courses are the minimum requirements. The high-level courses are also acceptable.		
Declare major at the end of Second Year	MA102B	Calculus II A	MA101B
	PHY105B	General Physics B (II)	PHY103B
	MA107A	Linear Algebra A	NA
	CS102B	Introduction to Computer Programming B	NA
	EE104	Fundamentals of Electric Circuits	MA101B、MA107B
	MAE203B	Engineering Mechanics I – Statics and Dynamics	MA107B
	EE205	Signals and Systems	NA
	ME307	Fundamentals of Control Engineering	EE104
	Notes: The above courses are the minimum requirements. The high-level courses are also acceptable.		

VIII. Requirements for GE Required Courses

(I) Science Module

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	Instruction Language	Prerequisite	Dept
MA101B	Calculus I A	4		4	1/Fall	E	NA	MATH
MA102B	Calculus II A	4		4	1/Spr	E	Calculus I A	MATH
MA107A	Linear Algebra A	4		4	2/Fall	E	NA	MATH
PHY103B	General Physics B (I)	4		4	2/Spr	E	NA	PHY
PHY105B	General Physics B (II)	4		4	3/Fall	E	General Physics B (I)	PHY
CH101B	General Chemistry B	3		3	1/Spr/Fall	E	NA	CHEM
CS102B	Introduction to Computer Programming B	3	1	4	1/Spr/Fall	E	NA	CSE
PHY104B	Experiments of Fundamental Physics	2	2	4	1/Spr/Fall	E	NA	PHY
Total		**28**	**3**	**31**				

(II) Physical Education

Course Code	Course Name	Credits	Hours/week	Terms	Instruction language	Prerequisite	Dept.
GE131	Physical Education I	1	2	Fall	C	NA	PE Center
GE132	Physical Education III	1	2	Spr	C	NA	
GE231	Physical Education III	1	2	Fall	C	NA	
GE232	Physical Education IV	1	2	Spr	C	NA	
GE331	Physical Education V	0	2	Fall	C	NA	
GE332	Physical Education Ⅵ	0	2	Spr	C	NA	
Total		4	12				

GE131、GE132、GE231、GE232、GE331、GE332 are required PE courses offered by Center For Physical Education. Students are required to select a specific sport program each semester. Student who meets the exemption conditions stated in "SUSTech Physical Education Course Exemption Regulation" can apply for exemption from GE331 and GE332.

(III) Chinese Languages & Culture

Course Code	Course Name	Credit	Hours/week	Term	Language Instruction	Prerequisite	Dept.
CLE008	Elementary Chinese I	2	4	1/Fall	B	NA	CLE
CLE009	Elementary Chinese II	2	4	1/Spr	B	CLE008	
CLE027	Intermediate Chinese I	2	4	2/Fall	B	CLE009	
CLE028	Intermediate Chinese II	2	4	2/Spr	B	CLE027	
CLE031	Advanced Chinese I	2	4	3/Fall	B	CLE028	
CLE032	Advanced Chinese II	2	4	3/Spr	B	CLE031	
CLE033	Chinese Culture	2	2	Spr/Fall	B/E	NA	CLE/ HUM/ SSC
CLE034	Chinese History	2	2	Spr/Fall	B/E	NA	

(IV) English Language

Students will undertake the English Placement Test and be placed into three levels according to the result of the test and their performance in the National College Entrance Exam. Students at different levels are required to take the courses with a different credit value in total.

Level A: 8 credits; SUSTech English III, English for Academic Purposes and 2-credit CLE elective course

Level B: 12 credits; SUSTech English II, SUSTech English III, English for Academic Purposes, and 2-credit CLE elective course

Level C: 14 credits; SUSTech English I, SUSTech English II, SUSTech English III, and English for Academic Purposes.

List of English Language Courses

Course Code	Course Name	Credit	Hours/week	Language Instruction	Prerequisite	Dept	Notes
CLE021	SUSTech English I	4	4	E	NA	CLE	Required
CLE022	SUSTech English II	4	4	E	CLE021		
CLE023	SUSTech English III	4	4	E	CLE022		
CLE030	English for Academic Purposes	2	2	E	CLE023		
/	(at least one 2-credit CLE elective course)	2	2	E	CLE030		Level A & B Required

（VI）Requirements for GE Elective Courses

(I) Students are required to complete 4 credits for the Humanities Module and Social Sciences Module respectively, and 2 credits for the Music and Art Module. (Information about the available courses and the instruction language will be announced before the course selection session)

(II) Students are required to complete 6 credits for Science Module.

Course Code	Course Name	Credit	Lab Credits	Hours / week	Term	Language Instruction	Prerequisite	Dept
BIO102B	Introduction to Life Science	3		3	1/Spr/Fall	E	NA	BIO
CS205	C/C++ Program Design	3	1	4	2/Fall	B	NA	CSE
EE201-17	Analog Circuits	3		3	2/Fall	B	PHY105B, EE104	EE
EE202-17	Digital Circuits	3		3	2/Spr	B	PHY105B	EE
MA201b	Ordinary Differential Equation B	4	1	5	2/Spr	B	MA102B	MA
MA206	Mathematics Modelling	3	1	4	2/Spr	B	MA201b	MA
Total		**19**	**3**	**22**				

X. Major Course Arrangement

Table 1: Major Required Course (Foundational and Core Courses)

Course Category	Course Code	Course Name	Credit	Lab Credits	Hours / week	Term	Advised term to take the course	Instruction language	Prerequisite	Dept.
Major Foundational Courses	EE104	Fundamentals of Electric Circuits	2		2	Spr	1/Spr	C/E	MA101B, MA107B	EE
	ME102	CAD and Engineering Drawing	3	1.5	4.5	Fall/ Spr/ Smr	1/Smr	B/E	NA	MEE
	ME103	Awareness Practice of Manufacturing Engineering	3	2	5	Fall/ Spr /Smr	2/Fall	B/E	NA	MEE
	MAE203B	Engineering Mechanics I – Statics and Dynamics	3		3	Fall/ Spr	2/Fall	E	MA107B	MAE
	EE205	Signals and Systems	3	1	4	Fall/ Spr	2/Fall	B/E	MA101B	EE
	MA212	Probability and Statistics	3	1	4	Fall	2/Fall	E	MA102B	MA
	MAE202	Mechanics of Materials	3		3	Fall/ Spr	2/Fall	E	MA107A, MA102B	MAE
	ME307	Fundamentals of Control Engineering	3	0.5	3.5	Fall/ Spr	2/Spr	B/E	EE104	MEE
	ME303	Fundamentals of Machine Design	3	1	4	Fall/ Spr	2/Spr	B/E	MAE203B, ME102, MAE202	MEE
	Total		**26**	**7**	**33**					
Major Core Courses	ME331	Robot Modeling and Control	3		3	Fall	3/Fall	B/E	MAE203B	MEE
	EE423-14	Pattern Recognition*	3	1	4	Fall	3/Fall	B	MA107A, EE205, MA212	EE
	CS303B	Artificial Intelligence B*	3	1	4	Fall	3/Fall	B	CS102B , CS203B, MA212	CS
	CS405	Machine Learning*	3	1	4	Fall	4/Fall	B	MA107A, MA212	CS
	ME336	Collaborative Robot Learning*	3	1	4	Spr	3/Spr	E	ME306 or ME331	MEE
	ME338	Machine Learning for Engineering*	3		3	Fall	4/Fall	B	MA212、CS102B、MA107A	MEE
	ME321	Sensors and Actuators**	3	1	4	Spr	2/Spr	E	EE104	MEE
	ME322	Actuation System for Robotics**	3	1	4	Fall	3/Fall	E	MA102B	MEE

	ME333	Mechatronic Systems	3	1	4	Fall/ Spr	3/Spr	E	ME331	MEE
	Total		27	7	34					
Practice-based Courses	ME494	Practice I	1	1	2					MEE
	ME495	Practice II	2	2	4					MEE
	ME496	Innovation and Entrepreneurship: Practice and Principles	2	2	4					MEE
	ME493	Senior Project***	8	8	16					MEE
	Total		**13**	**13**	**26**					

Notes:

*Must complete one of the following courses, EE423-14 Pattern Recognition, CS303B Artificial Intelligence B , CS405 Machine Learning, ME336 Collaborative Robot Learning, or ME338 Machine Learning for Engineering

** Must complete one of the following courses, ME321 Sensors and Actuators, ME322 Actuation System for Robotics.

****Students who have completed Comprehensive Design Ⅰ&Ⅱ （COE491 & COE492）are not required to take the Senior Project（ME493）.

Table 2: Major Elective Courses

Course Code	Course Name	Credits	Lab Credits	Hours / week	Term	Advised term to take the course	Instruction language	Prerequisite	Dept.
ME232	Prolegomenon to Robotics	3		3	Spr	1/Spr	E	NA	MEE
MEE5002	Fundamentals and practices of project management	3		3	Fall	2/Fall	C	NA	MEE
ME332	Robot Operating System	3	1	4	Spr	2/Spr	B	CS102B	MEE
CS203B	Date Structure and Algorithm Analysis B	3	1	4	Fall	3/Fall	B	CS102A	CS
ME313	Product Design Practice	3	1	4	Spr	3/Spr	B	ME303 or ME306 or ME331	MEE
MEE5116	Advanced Kinematics and Dynamics of Mechanisms	3		3	Spr	3/Spr	B	ME306 or ME331	MEE
ME301	Dynamics and Vibration*	3	1	4	Fall/Spr	3/Spr	E	MAE203B, MA201b	MEE
ME302	Fundamentals of Manufacturing	3		3	Fall/Spr	3/Spr	E	ME103, ME303	MEE
CS308	Computer Vision	3	1	4	Spr	3/Spr	B	NA	CS
MEE5105	Fundamentals of Engineering Optimization	3		3	Spr	3/Spr	E	MA102B, MA107B	MEE
MEE5108	Microrobotics	3		3	Spr	3/Spr	E	ME307	MEE
MEE5107	Microfabrication and Microsystems	3		3	Spr	3/Spr	E	ME307	MEE
MEE5103	Walking Robot	3	0.5	3.5	Spr	3/Spr	B	ME306 or ME331	MEE
ME314	Finite Element Theory and Its Engineering Applications	3		3	Spr	3/Spr		MAE202, MA107A	MEE
MEE5110	Soft Robot	3		3	Fall	4/Fall	B	ME303	MEE
ME424	Modern Control and Estimation	3		3	Fall	4/Fall	E	ME307	MEE
MEE5115	Autonomous Robitc Systems	3		3	Fall	4/Fall	E	MA107A, MA212	MEE
CS401	Intelligent Robotics	3	1	4	Spr	4/Spr	E	MA212, CS102B, CS203	CS
Total		**54**	**6.5**	**60.5**					

Notes:

1. The minimum of 9 credits is required for the above courses.
2. In addition, students are required to take optional courses under the guidance of tutors, with a minimum of 6 credits.
1. *MAE314 Theory of Vibration can be identified as ME301 Dynamics and Vibration.

Table 3: Overview of Practice-Based Courses

Course Code	Course Name	Credits	Lab Credits	Hours / week	Term	Advised term to take the course	Instruction language	Prerequisite	Dept.
ME102	CAD and Engineering Drawing	3	1.5	4.5	Fall/Spr/Smr	1/Smr	B/E	NA	MEE
ME103	Awareness Practice of Manufacturing Engineering	3	2	5	Fall/Spr /Smr	2/Fall	B/E	NA	MEE
EE205	Signals and Systems	3	1	4	Fall/Spr	2/Fall	B/E	MA101B	EE
MA212	Probability and Statistics	3	1	4	Fall	2/Fall	E	MA102B	MA
ME307	Fundamentals of Control Engineering	3	0.5	3.5	Fall/Spr	2/Spr	B/E	EE104, MA201b	MEE
ME303	Fundamentals of Machine Design	3	1	4	Fall/Spr	2/Spr	B/E	MAE203B, ME102, MAE202	MEE
EE423-14	Pattern Recognition	3	1	4	Fall	3/Fall	B	MA107A, EE205, MA212	EE
CS303B	Artificial Intelligence B	3	1	4	Fall	3/Fall	B	CS102B , CS203B, MA212	CS
CS405	Machine Learning	3	1	4	Fall	4/Fall	B	MA107A, MA212	CS
ME336	Collaborative Robot Learning	3	1	4	Spr	3/Spr	E	ME306 or ME331	MEE
ME321	Sensors and Actuators	3	1	4	Spr	2/Spr	E	EE104	MEE
ME322	Actuation System for Robotics	3	1	4	Fall	3/Fall	E	MA102B	MEE
ME333	Mechatronic Systems	3	1	4	Fall/Spr	3/Spr	E	ME331	MEE
ME332	Robot Operating System	3	1	4	Spr	2/Spr	B	CS102B	MEE
CS203B	Date Structure and Algorithm Analysis B	3	1	4	Fall	3/Fall	B	CS102A	CS
ME313	Product Design Practice	3	1	4	Spr	3/Spr	B	ME303 or ME306 or ME331	MEE
ME301	Dynamics and Vibration	3	1	4	Fall/Spr	3/Spr	E	MAE203B, MA201b	MEE
CS308	Computer Vision	3	1	4	Spr	3/Spr	B	NA	CS
MEE5103	Walking Robot	3	0.5	3.5	Spr	3/Spr	B	ME306 or ME331	MEE
CS401	Intelligent Robotics	3	1	4	Spr	4/Spr	E	MA212, CS102B, CS203	CS
ME494	Practice I	1	1	2					MEE
ME495	Practice II	2	2	4					MEE

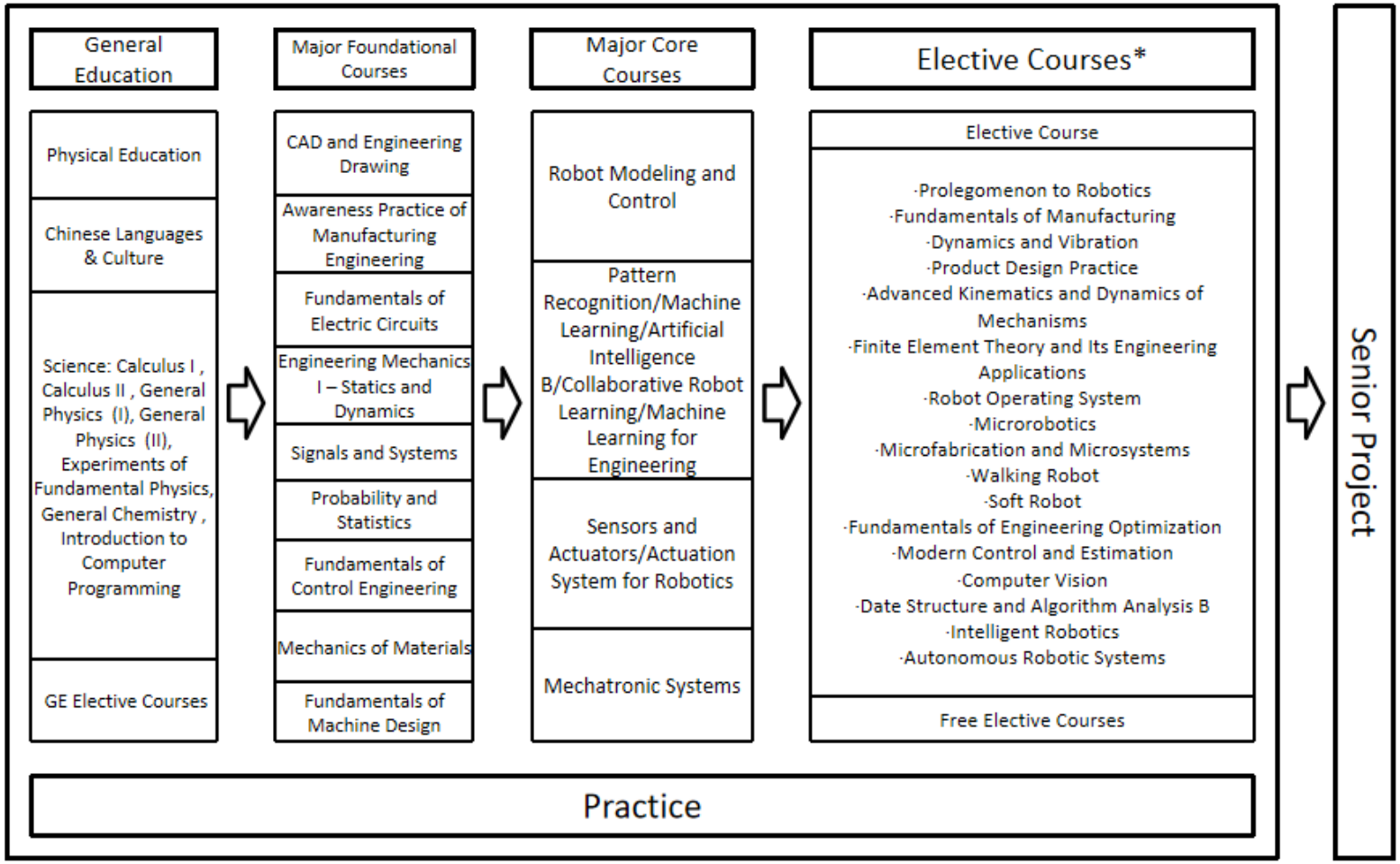
ME496	Innovation and Entrepreneurship: Practice and Principles	2	2	4					MEE
ME493	Senior Project	8	8	16					MEE
Total		**73**	**33.5**	**106.5**					

Table 4: Overview of Course Hours and Credits

Course Category	Total Course Hours	Total Credits	Credit Requirements	Percentage of the Total*
General Education (GE) Required Courses (not including English courses)	1136	48	48	36.92%
General Education (GE) Elective Courses			16	12.31%
Major Foundational Courses	528	26	26	20.00%
Major Core Courses	544	27	12	9.23%
Major Elective Courses	968	54	15	11.54%
Research Projects, Internship and Undergraduate Thesis/Projects	416	13	13	10.00%
Total (not including English courses)	3592	142	130	100%

***** Percentage of the total= Credit requirements of each line / Total credit requirements

Curriculum Structure of Robotics Engineering



Notes*: Elective Courses only list some courses, all courses are detailed in the program.