

# **Program of Robotics Engineering for International Students (2019)**

## **I. Introduction**

Robotics Engineering is an interdisciplinary major focusing on mechanical, electronic and computer technology. The goal 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 major scientific problems and engineering challenges in the future. On research direction covers industrial robots, robot software, bionic robot, medical robots, special robot, micro robot 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, strive to in a short period of time of the country's economic development strategy and shenzhen informatization, intellectualization and manufacturing comprehensive upgrade a long-term positive impact.

## **II. Objectives and Learning Outcomes**

This major strategic needs for mid-long term development planning and the development of Robotics Engineering in the future, committed to the training has a solid scientific foundation, excellent innovation practice ability and broad international vision, good at the integrated use of robotics and related disciplines theory and method, to solve the problem of future important scientific and engineering challenges of leading talents.

Undergraduates with degree from MEE will be equipped with the following knowledge, capability, and accomplishment.

Solid and broad basic theoretical knowledge (including mathematics, physics, machinery, automation, electronics, computer, etc.), as well as professional knowledge in robot engineering;

Master the scientific research methods and engineering design methods of robot engineering major, and understand the theory, engineering technology and industry development trend and frontier of this major;

With rigorous and practical scientific attitude, the pursuit of excellence, a strong sense of social responsibility and mission, and good communication skills;

Innovative thinking and the ability to independently understand and solve problems;

Have international vision, connect with international professional and industrial development ability.

## **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: 135credits (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 (74 credits)	Major Foundational Courses	23
	Major Core Courses	18
	Major Elective Courses	17
	Research Projects, Internship and Undergraduate Thesis / Projects	13
Total (not including English courses)		135

#### IV. Discipline

Robotics Engineering (080803T)

#### V. Main Courses

Fundamental Courses of Engineering: Fundamental Courses of Robotics Engineering: Fundamentals of Electric Circuits, CAD and Engineering Drawing,, Engineering Mechanics I – Statics and Dynamics, Mechanics of Materials, Signals and Systems, Probability and Statistics, Fundamentals of Control Engineering, Fundamentals of Machine Design, etc.

Core Courses of Robotics Engineering : Fundamentals of Robotics (Robot Modeling and Control), Pattern Recognition ,Machine Learning,, Advanced Actuation for Robots, Robot Operating System, Sensing Technology , Advanced Actuation for Robots, Embedded System and Robot, 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	Language Instruction	Prerequisite	Dept
MA101B	Calculus I A	4		4	1/Fall	E	NA	MA
MA102B	Calculus II A	4		4	1/Spr	E	MA101B	MA
MA107A	Linear Algebra A	4		4	1/Fall	E	NA	MA
PHY103B	General Physics B (I)	4		4	1/Fall	E	NA	PHY
PHY105B	General Physics B (II)	4		4	1/Spr	E	PHY103B	PHY
CS102B	Introduction to Computer Programming B	3	1	4	1/Spr/ Fall	E	NA	CS
PHY104B	Experiments of Fundamental Physics	2	2	4	1/Spr/ Fall	E	NA	PHY
CH101B	General Chemistry B*	3		3	1/Spr/ Fall	E	NA	CH
<b>Total</b>		<b>28</b>	<b>3</b>	<b>31</b>				

### (II) Physical Education

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	Language Instruction	Prerequisite	Dept
GE131	Physical Education I	1		2	1/Fall	C	NA	PE Center
GE132	Physical Education II	1		2	1/Spr	C	NA	
GE231	Physical Education III	1		2	2/Fall	C	NA	
GE232	Physical Education IV	1		2	2/Spr	C	NA	
<b>Total</b>		<b>4</b>		<b>8</b>				

### (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	
Total		16	28				

#### (IV) English Language

All students are required to undertake the English Placement Test before selecting courses, based on which students will be assigned to 3 levels to be ready for the courses with English as the instruction language.

SUSTech English III, English for Academic Purposes are required for Level A.

SUTech English II, SUSTech English III, English for Academic Purposes for Level B.

SUSTech English I, SUSTech English II, SUSTech English III, English for Academic for Level C.

Course Code	Course Name	Credit	Hours/week	Instruction Language	Prerequisite	Dept
CLE021	SUSTech English I	4	4	E	NA	CLE
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	

#### IX 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
ME112	Introduction to Matlab	2	1	3	1/Spr	B	NA	MEE
ME232	Prolegomenon to Robotics	3		3	1/Spr	B	NA	MEE
ME103	Awareness Practice of Manufacturing Engineering	3	2	5	1/Smr	B	NA	MEE

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, EE201-17	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
<b>Total</b>		<b>27</b>	<b>7</b>	<b>34</b>				

## 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	take the course Advised term to	Instruction language	Prerequisite	Dept.
Major Foundational Courses	EE104	Fundamentals of Electric Circuits	2		2	Spr	1/Spr	B	MA101B, MA107B	EE
	ME102	CAD and Engineering Drawing	3	15	45	Fall/Spr/Smr	1/Smr	E/B	NA	MEE
	MAE203B	Engineering Mechanics I – Statics and Dynamics	3		3	Fall	2/Fall	C	MA107B	MAE
	EE205	Signals and Systems	3	1	4	Fall	2/Fall	B	MA101B	EE
	MA212	Probability and Statistics	3	1	4	Fall	2/Fall	B	MA102B	MATH
	MAE202	Mechanics of Materials	3		3	Spr	2/Spr	C	MA107BM A102B	MAE
	ME307	Fundamentals of Control Engineering	3	05	35	Fall/Spr	2/Spr/Fall	E	EE104	MEE
	ME303	Fundamentals of Machine Design	3	1	4	Fall/Spr	3/Fall	E	MAE203B ME102 MAE202	MEE
	<b>Total</b>			<b>23</b>	<b>5</b>	<b>28</b>				
Major Core Courses	ME332	Robot Operating System	3	1	4	Spr	2/Spr	B	CS102B	MEE
	ME331	Robot Modeling and Control*	3		3	Fall	3/Fall	B	MAE203B	MEE
	ME306	Fundamentals of Robotics*	3	1	4	Spr	3/Spr	B	ME303 ME307	MEE
	EE423-14	Pattern Recognition**	3	1	4	Fall	3/Fall	C/E	MA107A EE205 MA212	EE
	ME338	Statistical and Deep Learning**	3		3	Spr	3/Spr	E		MEE
	CS405	Machine Learning**	3	1	4	Fall	4/Fall	B	MA107A MA212	CSE
	ME337	Advanced Actuation for Robots	3	1	4	Fall	3/Fall	B	ME102B	MEE
	ME425	Sensing Technology	3	1	4	Spr	3/Spr	E	ME306 or ME331	MEE
	ME432	Embedded System and Robot	3	1	4	Fall	4/Fall	B	ME306 or ME331	MEE
	<b>Total</b>			<b>27</b>	<b>7</b>	<b>34</b>				
Practice	ME494	Practice I	1	1	2					MEE
	ME495	Practice II	2	2	4					MEE
	ME496	Projects of Innovation and	2	2	4					MEE

	Entrepreneurship								
ME493	Senior Project***	8	8	16					MEE
	<b>Total</b>	<b>13</b>	<b>13</b>	<b>26</b>					
<p>Notes:</p> <ol style="list-style-type: none"> <li>1. *Must complete one of the following courses, ME331 Robot Modeling and Control or ME306 Fundamentals of Robotics.</li> <li>2. **Must complete one of the following courses, EE423-14 Pattern Recognition, ME338 Statistical and Deep Learning or CS405 Machine Learning.</li> <li>3. ****Students who have completed Comprehensive Design I &amp; II (COE491 &amp; COE492) are not required to take the Senior Project (ME493) .</li> </ol>									



**Table 2: Major Elective Courses**

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	Take the course Advised term to	Instruction language	Prerequisite	Dept.
EE323	Digital Signal Processing	3	1	4	Fall	3/Fall	E	EE205	EE
CS203B	Date Structure and Algorithm Analysis B	3	1	4	Fall	3/Fall	B	CS101A	CS
CS305B	Computer Networks B	3	1	4	Fall	3/Fall	B	CS101A	CS
CS303B	Artificial Intelligence B	3	1	4	Fall	3/Fall	B	CS101A CS203B MA212	CS
ME301	Dynamics and Vibration*	3	1	4	Fall/ Spr	3/Spr	E	MAE203B MA201b	MEE
EE326	Digital Image Processing	3	1	4	Spr	3/Spr	E	EE205	EE
EE332	Digital System Design	3	1	4	Spr	3/Spr	E	EE202-17	EE
EE328	Speed Signal Processing	3	1	4	Spr	3/Spr	E	EE323	EE
ME426	Fundamentals of Engineering Optimization	3		3	Spr	3/Spr	E	MA102B, MA107B	MEE
ME334	Microrobotics	3		3	Spr	3/Spr	E	ME307	MEE
ME335	Microfabrication and Microsystems	3		3	Spr	3/Spr	E	PHY105B	MEE
ME336	Collaborative Robot Learning	3	1	4	Spr	3/Spr	E	ME306 or ME331	MEE
ME434	Walking Robot	3	0.5	3.5	Spr	3/Spr	B	ME306 or ME331	MEE
CS308	Computer Vision	3	1	4	Spr	3/Spr	B	NA	CS
CS310	Multi-agent System	3	1	4	Spr	3/Spr	E	CS303	CS
CS401	Intelligent Robotics	3	1	4	Spr	4/ Spr	B	CS101A CS203 C,S202	CS
ME435	Soft Robot	3		3	Fall	4/Fall	B	ME303	MEE
ME431	Application and Innovation of Robotics	3	1	4	Fall	4/Fall	B	ME306 or ME331	MEE
ME424	Modern Control and Estimation	3		3	Fall	4/Fall	E	ME307	MEE
<b>Total</b>		<b>57</b>	<b>135</b>	<b>705</b>					
Notes:									
1. The minimum of 12 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 5 credits.									
3. *MAE314 Theory of Vibration can be identified as ME301 Dynamics and Vibration.									

**Table 3: Overview of Practice-Based Courses**

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	take the course Advised term to	Instruction language	Prerequisite	Dept.
ME102	CAD and Engineering Drawing	3	1.5	4.5	Fall/Spr/Smr	1/Smr	E/B	NA	MEE
EE205	Signals and Systems	3	1	4	Fall	2/Fall	B	MA101B	EE
MA212	Probability and Statistics	3	1	4	Fall	2/Fall	B	MA102B	MA
ME307	Fundamentals of Control Engineering	3	0.5	3.5	Fall/Spr	2/Spr/Fall	E	EE104	MEE
ME303	Fundamentals of Machine Design	3	1	4	Fall/Spr	3/Fall	E	MAE203B,ME102,MAE202	MEE
ME332	Robot Operating System	3	1	4	Spr	2/Spr	B	CS102B	MEE
ME306	Fundamentals of Robotics*	3	1	4	Spr	3/Spr	B	ME303,ME307	MEE
EE423-14	Pattern Recognition**	3	1	4	Fall	3/Fall	C/E	MA107A,EE205,MA212	EE
CS405	Machine Learning*	3	1	4	Fall	4/Fall	B	MA107A,MA212	CS
ME337	Advanced Actuation for Robots	3	1	4	Fall	3/Fall	B	ME102B	MEE
ME425	Sensing Technology	3	1	4	Spr	3/Spr	E	ME306 or ME331	MEE
ME432	Embedded System and Robot	3	1	4	Fall	4/Fall	B	ME306 or ME331	MEE
EE323	Digital Signal Processing	3	1	4	Fall	3/Fall	E	EE205	EE
CS203B	Date Structure and Algorithm Analysis B	3	1	4	Fall	3/Fall	B	CS101A	CS
CS305B	Computer Networks B	3	1	4	Fall	3/Fall	B	CS101A	CS
CS303B	Artificial Intelligence B	3	1	4	Fall	3/Fall	B	CS101A,CS203B,MA212	CS
ME301	Dynamics and Vibration	3	1	4	Fall/Spr	3/Spr	E	MAE203B MA201b	MEE
EE326	Digital Image Processing	3	1	4	Spr	3/Spr	E	EE205	EE
EE332	Digital System Design	3	1	4	Spr	3/Spr	E	EE202-17	EE
EE328	Speed Signal Processing	3	1	4	Spr	3/Spr	E	EE323	EE
ME336	Collaborative Robot Learning	3	1	4	Spr	3/Spr	E	ME306 or ME331	MEE
ME434	Walking Robot	3	0.5	3.5	Spr	3/Spr	B	ME306 or ME331	MEE
CS308	Computer Vision	3	1	4	Spr	3/Spr	B	NA	CS
CS310	Multi-agent System	3	1	4	Spr	3/Spr	E	CS303	CS
CS401	Intelligent Robotics	3	1	4	Spr	4/ Spr	B	CS101A,CS203C,S202	CS
ME431	Application and Innovation of Robotics	3	1	4	Fall	4/Fall	B	ME306 or ME331	MEE
ME494	Practice I	1	1	2					MEE

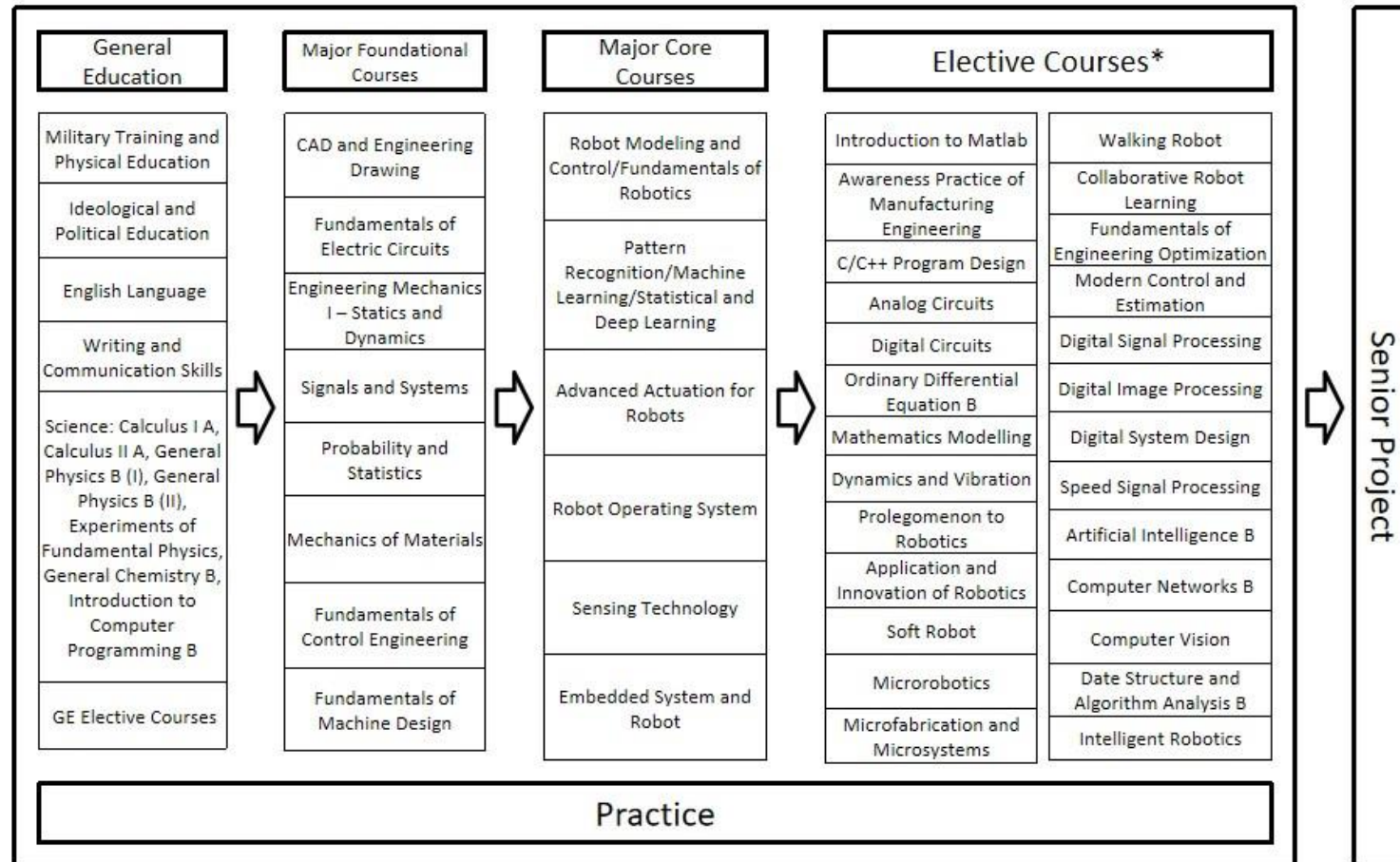
ME495	Practice II	2	2	4					MEE
ME496	Projects of Innovation and Entrepreneurship	2	2	4					MEE
ME493	Senior Project	8	8	16					MEE
<b>Total</b>		<b>91</b>	<b>385</b>	<b>1295</b>					

**Table 4: Overview of Course Hours and Credits**

<b>Course Category</b>	<b>Total Course Hours</b>	<b>Total Credits</b>	<b>Credit Requirements</b>	<b>Percentage of the Total*</b>
<b>General Education (GE) Required Courses (not including English courses)</b>			48	20.74%
<b>General Education (GE) Elective Courses</b>			17	2.96%
<b>Major Foundational Courses</b>	448	23	23	11.85%
<b>Major Core Courses</b>	544	34	18	2.96%
<b>Major Elective Courses</b>	1592	57	17	2.96%
<b>Research Projects, Internship and Undergraduate Thesis/Projects</b>	416	13	13	1.48%
<b>Total (not including English courses)</b>			135	4.44%

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

# Curriculum Structure of Robotics Engineering (2019)



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

