

# **Program of Theoretical and Applied Mechanics for International Students (2019)**

## **I. Introduction**

Theoretical and Applied Mechanics (TAM) is a basic while highly practical scientific discipline with long history, rapid development, and widespread applications. Its strong technical implications make TAM the foundation for many industries and various engineering areas such as aerospace engineering, ocean engineering, manufacturing, civil engineering, and astromechanics. Therefore, students with TAM training often become leaders with a holistic view of technology.

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

Students majored in TAM will be equipped with necessary theory, knowledge and skills to become senior specialists for research, education, R&D and management in mechanics and related areas.

### Learning Outcomes

1. Morality and humanity. With patriotism and professionalism, a firm attitude of pursuing excellence, a sound personality, a sense of social responsibility and rich humanities and sciences accomplishment.

2. Basic knowledge. Master the basic theoretical knowledge and skills of engineering such as mathematics, mechanics, physics, electronics, machinery and so on.

### 3. Core knowledge

3.1 Master the knowledge of the core courses in basic disciplines such as mathematics, mechanics, physics, and information technology, and at the same time have strong computer and foreign language application capabilities.

3.2 Master the core knowledge of mechanics as the engineering foundation and the basic knowledge of mechanics or one other engineering (e.g. aviation, aerospace, machinery, automobiles, energy, environment, etc.)

3.3 Have the basic laboratory and design skills in mechanics and engineering.

4. Understand the frontier of the subject. Understand the development, theoretical frontier and application prospect of the mechanics and some major projects.

5. Master the basic methods of literature retrieval and data query, and have the ability to engage in scientific research and practical work.

6. Management ability and teamwork ability. Good organizational and management skills, good communication skills, as well as environmental adaptation, team work ability.

7. International vision. Has the international vision and certain international exchange and

cooperation ability.

8. Lifelong learning. Have the consciousness of lifelong learning and self-learning ability, innovative consciousness and grasp the basic innovative methods.

### III. Study Length and Graduation Requirements

Study length: 4 years

Degree conferred: Bachelor of Science

The minimum credit requirement for graduation: 133 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 (13 credits)	Humanities	4
	Social Sciences	4
	Arts	2
	Science	3
Major Course (72 credits)	Major Foundational Courses	17
	Major Core Courses	20
	Major Elective Courses	18
	Research Projects, Internship and Undergraduate Thesis / Projects	17
Total (not including English courses)		133

### IV. Discipline

Theoretical and Applied Mechanics

### V. Main Courses

Theoretical Mechanics I, Theoretical Mechanics II, Strength of Materials, Fluid Mechanics, Elasticity, Experimental Mechanics, Computational Mechanics

### VI. Practice-Based Courses

Including: Research and Innovation Projects, Metalworking Practices, Summer Internship, Degree Thesis (or Design)

## 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	
	MA102B	Calculus II A	MA101B
	MA107A	Linear Algebra A	
	PHY103B	General Physics B (I)	
	PHY105B	General Physics B (II)	PHY103B
Declare major at the end of Second Year	MA101B	Calculus I A	
	MA102B	Calculus II A	MA101B
	MA107A	Linear Algebra A	
	PHY103B	General Physics B (I)	
	PHY105B	General Physics B (II)	PHY103B
	MAE203	Theoretical Mechanics I	MA109 MA102B

## 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		MATH
MA102B	Calculus II A	4		4	1/Spr	E	MA101B	
MA107A	Linear Algebra A	4		4	1/Fall	E		MATH
PHY103B	General Physics B (I)	4		4	1/Fall	E		PHY
PHY105B	General Physics B (II)	4		4	1/Spr	E	PHY103B	
CH101B	General Chemistry B	3		3	1/Spr/Fall	E		CHEM
CS102B	Introduction to Computer Programming B	3	1	4	1/Spr/Fall	E		CSE
PHY104B	Experiments of Fundamental Physics	2	2	4	1/Spr/Fall	E		PHY
Total		28	3	31				

### (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	
Total		4		8				

### (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 3 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	B		BIO
MAE101	Experimental DIY: Discover the beauty of mechanics	2	2	4	1/Spr/Fall	B		MAE
PHYS001	Open Physics Laboratory I	1	1	2	1/Smr	B		PHY
MAE205	Introduction to Aeronautics and Mechanics	2		2	2/ Fall	B		MAE
MAE206	Introduction to Aircraft Engines	1		1	2/Fall	B		MAE
Total		9	2	12				

## 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	ME102	CAD and Engineering Drawing	3	1.5	4.5	Fall/ Spr/ Smr	1/Spr	B	NA	MATH
	MAE209	Mechanical mathematics basis	4		4	Fall	2/Fall	B	MA102B PHY105B MA107A	MAE
	MAE203	Theoretical Mechanics I	3		3	Fall	2/Fall	C	MA109 MA102B	MAE
	MA212	Probability and Statistics	3		3	Fall / Spr	2/Fall	B	MA102C	MATH
	MA201b	Ordinary Differential Equation B	4		4	Fall / Spr	2/Spr	B	MA102C	MATH
	Total			17	1.5	18.5				
Major Core Courses	MAE202	Mechanics of Materials	3		3	Spr	2/Spr	B	MA107A MA102B	MAE
	MAE204	Theoretical Mechanics II*	3		3	Spr	2/Spr	B	MA107A MA102B	MAE
	MAE303	Fluid Mechanics	4		4	Fall	3/Fall	E	MA102B PHY105B	MAE
	MAE304	Elasticity	4		4	Spr	3/Spr	C	MAE203 MAE202	MAE
	MAE302-16	Fluid Mechanics Lab	3	3	6	Spr	3/ Spr	C	MAE303	MAE
	MAE401-16	Solid Mechanics Lab	3	3	6	Fall	3/Fall	C	MAE202	MAE
Total			20	6	26					
	MAE499	Research and Innovation Projects	2	2	4	Fall / Spr	4/Fall	C	无	MAE
	ME103	Awareness Practice of Manufacturing Engineering	3	2	5	Fall/Spr/ Smr		B	无	MEE
	MAE480	Summer Internship	4	4		Smr	3/Smr	C	无	MAE
	MAE490	Degree Thesis (or Design)	8	8		Spr	4/Spr		无	MAE
	Total			17	16	9				
Students who have completed Comprehensive Design I & II (COE491 & COE492) are not required to take the Graduation Project (or Thesis) (MAE490)										

**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.
EE104	Fundamentals of Electric Circuits	2		2	Fall/Spr	1/Spr	B	MA107B MA101B	EEE
CS205	C/C++ Programming Design	3	1	4	Spr	1/Spr	C		CSE
MAE498	Research and Innovation Projects of Mechanics and Aerospace Engineering	2	2	4	Fall/Spr	2/Fall-4/Fall	C		MAE
MAE305	Engineering Thermodynamics	3		3	Fall	2/Fall	B	MA102B	MAE
CS203B	Data Structures and Algorithm Analysis B	3	1	4	Fall	2/Fall	B	CS102A	CSE
PHY221	Open Physics Laboratory II	1	1	2	Fall	2/Fall	B		PHY
PHY201-15	Physics Laboratory II	2	2	4	Fall	2/Fall	B	PHY103B	PHY
PHY207-15	Electrodynamics I	3		3	Fall	2/Fall	C	PHY203-15	PHY
MAE208	Lectures on selected Engineering Software	2		2	Fall/Spr	2/Spr	C		MAE
MAE210	Engineering Materials	3		3	Spr	2/Spr	C		MAE
PHY202	Physics Laboratory III	2	2	4	Spr	2/Spr	B	PHY103B	PHY
MAE211	Overseas Practice	2	2	4	Smr	2/Smr	B		MAE
MAE405	Aerodynamics	3		3	Fall	3/Fall	B	MA102B	MAE
MAE309	General Principles of Transport Phenomena	3		3	Fall	3/Fall	E	MA102B	MAE
MAE312	Aircraft Flight Dynamics	3		3	Fall	3/Fall	E	MA102B	MAE
MAE307	Aircraft Structural Strength	3		3	Fall	3/Fall	E	MAE202	MAE
MAE313	Aero Engine Structure and Strength	3	1	4	Fall	3/Fall	E		MAE
MA303	Partial Differential Equations	3		3	Fall	3/Fall	B	MA201b	MATH
ME303	Fundamentals of Machine Design	3		3	Fall/Spr	3/Fall	B	ME102 MAE203B MAE202	MEE
ME307	Fundamentals of Control Engineering	3	1	4	Fall/Spr	3/Fall	B	EE104	MEE
MAE314	Advanced Numerical Methods	3		3	Spr	3/Spr	B	MA102B	MAE
MAE318	Theory of Vibration	3		3	Spr	3/Spr	E	MAE203B MA201b	MAE
MAE403	Computational Fluid Dynamics	3		3	Spr	3/Spr	E	MAE207 or MAE303	MAE
MAE310	Computational Solid Mechanics	3		3	Spr	3/Spr	E	MAE202	MAE
MAE320	Mechanism of Flight Vehicle	3		3	Spr	3/Spr	C	MAE207 or MAE303	MAE

MAE308	Heat Transfer	3		3	Spr	3/Spr	E	MA102B	MAE
MAE319	Interfacial Phenomena	3		3	Spr	3/Spr	C	PHY105B	MAE
MAE407	Jet and Propulsion	3		3	Spr	3/Spr	E	MAE305 or PHY204	MAE
MAE321	Multiphase Flow	3		3	Spr	3/Spr	E	MAE207	MAE
MAE410	Fracture Mechanics	3		3	Spr	3/Spr	E	MAE202	MAE
ME306	Fundamentals of Robotics	3	1	4	Fall/Spr	3/Spr	B	ME303 ME307	MEE
ME310	Fundamentals of Measurement Technology	3		3	Spr	3/Spr	B	ME307 EE205	MEE
MAE417	Aircraft Design Group Practice	3	2	5	Fall	4/Fall	B		MAE
MAE413	Mechanics of Composite Materials	3		3	Fall	4/Fall	B	MA102B	MAE
MAE419	Aerodynamic analysis and design of aircraft	2		2	Fall	4/Fall	C	MAE403	MAE
MAE311	Principles of Turbomachinery	3		3	Fall	4/Fall	C		MAE
<b>Total</b>		99	16	115					
Notes:									
1. Students are required to complete 18 credits for the Major Elective Courses.									



**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/Spr	B	NA	MEE
MAE211	Overseas Practice	2	2	4	Smr	2/Smr	B	NA	MAE
MAE302-16	Fluid Mechanics Lab	3	3	6	Spr	3/Spr	C	MAE303	
MAE401-16	Solid Mechanics Lab	3	3	6	Fall	3/Fall	C	MAE202	
MAE499	Research and Innovation Projects	2	2	4	Fall/Spr	4/Fall	C	NA	
ME103	Awareness Practice of Manufacturing Engineering (Metalworking Practices)	3	2	5	Fall/Spr/Smr	1/Fall -- 4/Fall	B	NA	MEE
MAE480	Summer Internship	4	4		Smr	3/Smr	C	NA	
MAE490	Degree Thesis(or Design)	8	8		Spr	4/Spr		NA	
<b>Total</b>		28	25.5	29.5					
Students who have completed Comprehensive Design I & II (COE491 & COE492) are not required to take the Graduation Project (or Thesis) (MAE490)									

**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	48	36.1%
<b>General Education (GE) Elective Courses</b>			13	9.8%
<b>Major Foundational Courses</b>	296	17	17	12.8%
<b>Major Core Courses</b>	416	20	20	15.0%
<b>Major Elective Courses</b>	1840	99	18	13.5%
<b>Research Projects, Internship and Undergraduate Thesis/Projects</b>	144	17	17	12.8%
<b>Total (not including English courses)</b>	2696	199	133	100%

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

## Curriculum Structure of Theoretical and Applied Mechanics for Class 2019



