Department of Mechanics and Aerospace Engineering

Program of Theoretical and Applied Mechanics for International Students (2021)

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	MA102B MA109orMAE209

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		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	Credits	Hours/week	Terms	Instruction language	Prerequisite	Dept.
GE131	Physical Education I	1	2	Fall	C	NA	PE Center
GE132	Physical Education II	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	Lab Credits	Hours/week	Term	Instruction Language	Prerequisite
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

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	Instruction Language	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

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
MAE112	Introduction to Matlab	2	1	3	1/Spr	C		ME
CS103	Introduction to Artificial Intelligence	2		2	1/Spr	E		CS
PHYS001	Open Physics Laboratory I	1	1	2	1/Smr	B		PHY
CS205	C/C++ Program Design	3		3	2/ Fall	E		CS
Total		11	2	13				

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	ME102	CAD and Engineering Drawing	3	1.5	4.5	Fall/ Spr/ Smr	1/Spr	B	NA	MATH
	MAE209	Foundations of Engineering Mathematics	4		4	Fall	2/Fall	B	MA102B PHY103B MA107A	MAE
	MAE203	Theoretical Mechanics I	3		3	Fall	2/Fall	~~B~~	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					MAE
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(or MAE209）	MAE
	MAE303	Fluid Mechanics	4		4	Fall	3/Fall	E	MA102B PHY105B	MAE
	MAE304	Elasticity	4		4	Spr	3/Spr	E	MAE203 MAE202 MAE209	MAE
	MAE302-16	Fluid Mechanics Lab	3	3	6	Spr	3/ Spr	B	MAE303	MAE
	MAE401-16	Solid Mechanics Lab	3	3	6	Fall	3/Fall	B	MAE202	MAE
	Total		20	6	26					
Practice-based Courses	MAE499	Research and Innovation Projects	2	2	4	Fall / Spr	4/Fall	B		MAE
	ME103	Awareness Practice of Manufacturing Engineering	3	2	5	Fall/Spr/ Smr		B		MEE
	MAE480	Summer Internship	4	4		Smr	3/Smr	B		MAE
	MAE490	Degree Thesis (or Design)	8	8		Spr	4/Spr			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	Credits	Lab Credits	Hours / week	Term	Advised term to take the course	Instruction language	Prerequisite	Dept.
EE104	Fundamentals of Electric Circuits	2		2	Fall/Spr	1/Spr	B	MA107B MA101B	EEE
MAE101	Experimental DIY: Discover the beauty of mechanics	2	2	4	Spr/Fall	1/Spr/Fall	B	NA	MAE
MAE102	Flight Simulating Experiment	1	1	2	Spr/Fall/ Smr	1/Spr/Fall /Smr	C	NA	MAE
MAE205	Introduction to Aeronautics and Mechanics	2		2	Fall	2/Fall	B	NA	MAE
MAE206	Introduction to Aircraft Engines	1		1	Fall	2/Fall	B	NA	MAE
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
MAE5028	Fundamentals of Combustion	3		3	Fall	3/Fall	B	MAE305	MAE
MAE5017	Aircraft Flight Dynamics	3		3	Fall	3/Fall	E	MAE209 MAE303	MAE

MAE323	Mordern Numerical Methods	3	1	4	Spr	3/Spr	E	MA102C MA107A	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
MAE5027	Interfacial Phenomena	3		3	Spr	3/Spr	C	PHY105B	MAE
MAE407	Jet and Propulsion	3		3	Spr	3/Spr	E	MAE305 or PHY204	MAE
MAE7001	Multiphase Flow	3		3	Spr	3/Spr	E	MAE207	MAE
MAE5021	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
MAE5020	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
Total		105	19	124					

Notes:
1. Students are required to complete18 credits for the Major Elective Courses.

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/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	B	MAE303	
MAE401-16	Solid Mechanics Lab	3	3	6	Fall	3/Fall	B	MAE202	
MAE499	Research and Innovation Projects	2	2	4	Fall/Spr	4/Fall	B	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	B	NA	
MAE490	Degree Thesis(or Design)	8	8		Spr	4/Spr		NA	
Total		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

Course Category	Total Course Hours	Total Credits	Credit Requirements	Percentage of the Total*
General Education (GE) Required Courses (not including English courses)	1072	48	48	36.1%
General Education (GE) Elective Courses			13	9.8%
Major Foundational Courses	296	17	17	12.8%
Major Core Courses	416	20	20	15.0%
Major Elective Courses	2048	108	18	13.5%
Research Projects, Internship and Undergraduate Thesis/Projects	472	17	17	12.8%
Total (not including English courses)	4304	210	133	100%

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

Curriculum Structure of Theoretical and Applied Mechanics for Class 2021