

Department of Mechanics and Aerospace Engineering

Program of Theoretical and Applied Mechanics (2017 UG Students)

I. Mission and Goals

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. 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.

SUSTech launched in 2011 with a mission to reform higher education in China. The university recognizes its responsibility as an engine of economic development, encouraging entrepreneurial activities among its faculty and students. SUSTech has 17 existing academic programs, ranging from financial mathematics to environmental and water resources engineering. New programs are being offered continuously to meet growing demands. SUSTech offers degrees of Bachelor, Master, and PhD. All together, SUSTech offers an unparalleled learning and research experience at the scientific and technological frontiers.

The Department of Mechanics and Aerospace Engineering (MAE) was founded in 2015 in order to meet the national strategic needs and to strengthen the overall curriculum offerings. MAE department has recruited 17 full-time faculty, including 11 professors, 4 associate professors, 2 assistant professors. The MAE faculty has 1 member of Chinese National Academy of Science, 1 member of Chinese National Academy of Engineering, 1 Changjiang Scholar, 4 fellows of Thousand-Talent Program, 5 fellows of Youth Thousand-Talent Program. Our world-class faculty all received education or research experience overseas, and they have gained a global vision, rich teaching experience, strong sense of responsibility, and deep understanding on education.

Research, Innovation and Entrepreneurship are the three pillars for SUSTech to stand out with distinctive characteristics.

Our goal is to build a strong, distinguish, and globalized TAM undergraduate program in five years. At the same time the MAE department will become first tier research center that focuses on urgent national needs with an emphasis on the education-research-commercialization model.

II. Requirement for degrees and credits

Program length: 4 years

Degree: Bachelor of Science.

Credit: The minimum credits are 133.5.

III. Major discipline

Theoretical and Applied Mechanics

IV. Core courses

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

V. Major hands-on training modules

1. Innovations in Science and Technology(Innovation and Entrepreneurship)
2. Starting from sophomore years, capable students interested in research may join faculty research labs, while those who are interested in entrepreneurship may participate innovation and entrepreneur activities. Students choose either options must apply for credits by the fall semester of their senior year.
3. Metalworking practices
4. Industry internship
5. Students led by faculty members will undertake internships in companies in aerospace engineering, ocean engineering, and manufacturing.
6. Senior Thesis/Design
7. Students shall independently complete a research project under the supervision of faculty members. Students shall write and successfully defend their Senior Thesis or report for Senior Design.

VI. Course components and minimum credit requirement

General Education (required): 50.5 credits (not including English courses)

General Education (elective): 10 credits (Linear Algebra II is required)

Foundation courses: 21 credits

Core major courses: 20 credits

Elective major courses: 15 credits

Innovation and Entrepreneurship: 2 credits

Metalworking practices: 3 credits

Summer internship: 4 credits

Senior Thesis/Design: 8 credits

Minimum to fulfill degree requirement: 133.5 credits (not including English courses)

VII、General Education Courses (required)

Course Code	Courses	Credits
MA101B	Calculus I A	4
MA102B	Calculus II A	4
MA103A	Linear Algebra I A	4
PHY103B	Physics I B	4
PHY105B	Physics II B	4
CH101B	Chemistry B	3
CS102B	Introduction to Programming B	3
BIO102B	General Biology B (Introduction to Life Science)	3
PHY104	Basic Physics Experiments	1.5

VIII、Prerequisite for Majoring in TAM

Course Code	Courses	Note
ME104b	Linear Algebra II	
ME102	CAD and Engineering Drawing	
PHY203-15	Introduction to Mathematical Methods in Physics	
MA201b	Ordinary Differential Equation B	
MAE203	Theoretical Mechanics I	
MA212	Probability and Statistics	
MAE202	Mechanics of Materials	
MAE204	Theoretical Mechanics I	

IX、 List of Courses

Table 1 Required Major Courses (prerequisite and core courses)

Category	Course Number	Courses	Credits	Hands-on Credits	Credit hours	Spring/Fall	Suggested semester	Language	Prerequisite	Offering department
TAM Foundation Courses	ME102	CAD and Engineering Drawing	3	1.5	4.5	Spr/ Fall/ Smr	1/Spr	C		ME
	MA104b	Linear Algebra II	4		4	S/F	1/Spr	C/E		Math.
	PHY203-15	Introduction to Mathematical Methods in Physics	4		4	Fall	2/Fall	C		Phys.
	MA201b	Ordinary Differential Equation B	4		4	Spr/ Fall	2/Spr	C/E		Math.
	MAE203	Theoretical Mechanics I	3		3	Fall	2/Fall	C	MA104b	
	MA212	Probability and Statistics	3		3	Spr/ Fall	2/Fall	C/E		Math.
	Total		21	1.5	22.5					
TAM Core Courses	MAE202	Mechanics of Materials	3		3	Spr	2/Spr	C/E	MA103A	
	MAE204	Theoretical Mechanics II*	3		3	Spr	2/Spr	C	MA103A	
	MAE303	Fluid Mechanics	4		4	Fall	3/Fall	E	PHY203-15	
	MAE304	Elasticity	4		4	Spr	3/Spr	C	MAE203 & MAE202	
	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	
	Total		20	6	26					
MAE499		Research and Innovation Projects**	2	2		Spr/ Fall	2/Fall-- 4/Fall			
ME103		Awareness Practice of Manufacturing Engineering***	3	2	5	Spr/ Fall /Smr	1/Smr -4/Sm r	C		ME
MAE480		Summer Internship***	4	4		Smr	3/Smr	C		
MAE490		Senior Thesis (or Design)	8	8		Spr	4/Spr			
Total			58	23.5						
*Note: MAE204 can be alternated by PHY205-15.										
**Note: Students can choose MAE499 during any semesters after sophomore year, therefore MAE499 is not included in weekly schedule										
***Note: ME103 and MAE480 are scheduled at the department and college level, therefore they are not included in the weekly schedule										

Table 2 Elective Courses

Course Number	Courses	Credits	Hands-on Credits	Credit hours	Spring/Fall	Suggested semester	Language	Prerequisite	Offering department
MAE498	MAE Research and Innovation Projects	2	2		Spr/ Fall	2/Fall-- 4/Fall	C		
MAE205	Introduction to Aeronautics and Mechanics	2		2	Fall	2/Fall	C		
MAE305	Engineering Thermodynamics	3		3	Fall	2/Fall	C		
MAE301	Theory of Vibrations	3		3	Spr	3/Spr	E		
MAE312	Aircraft Flight Dynamics	3		3	Fall	3/Fall	E		
MAE309	Principle of Transport Phenomena	3		3	Fall	3/Fall	E		
MAE206	Introduction to Aircraft Turbine Engines	2		2	Fall	2/Fall	C		
MAE308	Heat Transfer	3		3	Spr	3/Spr	E		
MAE310	Computational Solid Mechanics	3		3	Spr	3/Spr	C	MAE304	
MAE405	Aerodynamics	3		3	Fall	3/Fall	C		
MAE314	Advanced Numerical Methods	3		3	Spr	3/Spr	C/E		Grad
MAE403	Computational Fluid Dynamics	3		3	Spr	3/Spr	E	MAE303	
MAE407	Jet and Propulsion	3		3	Fall	3/Fall	E		
MAE409	Finite Element Method	3		3	Spr	3/Spr	C		
MAE413	Mechanics of Composite Materials	3		3	Fall	4/Fall	C/E		Grad
MAE415	Aerodynamic Design for Commercial Jets	2		2	Fall	4/Fall	C	MAE303	Grad
EE104	Fundamentals of Electric Circuits	2		2	Spr	2/Spr	C/E		EE
MA106	C/C++ Programming language	3	1	4	Spr	1/Spr	C		Math
MA303	Partial Differential Equations	3		3	Fall	3/Fall	C/E	MA201a	Math
MA333	Introduction to Big Data Science	3		3	Fall	3/Fall	C		Math
ME306	Fundamentals of Robotics	3	1	4	Spr/ Fall	3/Spr	C/E	MAE203 ME303 ME307	ME
PHYS001	Open Physics Laboratory I	1	1	2	Smr	1/Smr	C		Phys
PHY221	Open Physics Laboratory II	1	1	2	Fall	2/Fall	C		Phys
PHY202	Physics Laboratory III	2	2	4	Spr	2/Fall	C		Phys
PHY322	Lectures on Selected Research Software	2		2	Spr	2/Spr	C		Phys
GE3131	Literature Search and Writing in Science and Technology	1		1	Fall	3/Fall	C		Phys
PHY307	Modern Optics	3		3	Fall	3/Fall	C/E		Phys

PHY427	Introduction to Microelectronic fabrication	2	1	3	Fall	4/Fall	C/E	PHY326-15	Phys
PHY425	Modern Techniques in Materials Characterization	3	1	4	Fall	4/Fall	C/E	PHY206-15	Phys
ESE321	Scientific Presentation	2		2	Fall	3/Fall	C/E		Envir
Total		90	10						
Note 1: Choose at least 15 credits from this list Note 2: Choose at least one from MAE310, MAE403, and MAE 409 Note 3: Fluid Mechanics Direction, Choose at least one from MAE305, MAE405, and MAE 308; Solid Mechanics Direction, Choose at least one from MAE318, and MAE 413. Note 4: Choose at least 9 credits from courses of this department.									

Table 3 Hands-on Training Schedule

Course Number	Courses	Credits	Hands-on Credits	Credit hours	Spring/Fall	Suggested semester	Language	Prerequisite	Offering department
ME102	CAD and Engineering Drawing	3	1.5	4.5	Fall/ Spr/Sm r	1/Spr	C	NA	ME
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		Fall / Spr	2/Fall - 4/Spr		NA	
ME103	Awareness Practice of Manufacturing Engineering	3	2	5	Fall/ Spr/Sm r	1/Smr -4/Sm r	C	NA	ME
MAE480	Summer Internship	4	4		Smr	3/ Smr	C	NA	
MAE490	Degree Thesis (or Design)	8	8		Spr	4/ Spr		NA	

Table 4 Summary of Credits and Credit Hours

	Total Credits Hours	Total Credits	Minimum Requirement
General Education (required)	848	50.5	50.5
General Education (elective)			10
Foundation Courses	360	21	21
Core Courses (required)	416	20	20
Core Courses (elective)	1600	90	15
Senior Thesis/Design, Research and Innovation Projects, Summer Internship	544	17	17
Total	3800	200.5	133.5