

Co-Terminal Degree Proposal, Form 802 Attachment
Bachelor of Science in Mechanical Engineering
Master of Computational Engineering, Computational Mechanics Specialization

Undergraduate Program

Undergraduate Program Type: Bachelor of Science in Mechanical Engineering

Total Undergraduate Program Credit Hours (including shared credit): 127 hours

Program Description: Mechanical engineering is an essential part of most industries and modern technologies, and includes the analysis, design, and development of machines and structures that involve motion. Mechanical engineers are employed in areas such as the design and control of machinery; the development of means of transportation including automobiles, aircraft, space and marine vehicles, and railroads; computer-aided design and manufacture of products, consumer goods, devices, and industrial equipment; medical technology utilizing mechanical and electromechanical devices; the generation of energy from fossil and nuclear fuels; and the utilization, storage, and distribution of alternative energy sources.

Program Purpose: The co-terminal program between the BS in Mechanical Engineering and Master of Computational Engineering (MCE) allows students interested in future careers focused in computational aspects of engineering to enter the job force very competitively positioned to pursue these opportunities within engineering-based industries.

Program Benefits: The Master of Computational Engineering degree was one of six new interdisciplinary engineering degrees approved for Fall 2017. These interdisciplinary degrees reflect contemporary shifts in engineering education and increase the attractiveness of IIT with potential graduate students. By offering these new interdisciplinary graduate degrees as co-terminal programs with our current undergraduate degrees, we are providing our current undergraduate engineering students a path to greater competitiveness while they retain undergraduate financial aid benefits. Furthermore, engineering transfer students often face significant course sequencing challenges within engineering curriculums. Some transfer students solve this problem by pursuing co-terminal programs, and some choose to leave IIT. This co-terminal program will increase the options available to transfer students and potentially improve retention.

Course requirements and sample curriculum: Course requirements and a sample curriculum are included in this document.

Competitive Programs: BS ME is a competitive degree offered by many institutions. However, most schools do not offer a co-terminal BS ME and graduate degree in computational engineering.

Market Analysis: BS ME is a competitive degree offered by many institutions. The Master of Computational Engineering is a new degree program (Fall 2017). Please refer to the market analysis for the MCE degree provided in the 2017 degree program application for further information.

Marketing and Advertising: Both degrees are currently marketed. The co-terminal degree will be included in current co-terminal degree marketing and additional marketing by the Armour College of Engineering.

Enrollment Estimates: Estimated enrollment in this co-terminal program is 2-6 new students/year.

Retention Estimates: It is anticipated that retention may be improved for transfer students as the co-terminal program allows more flexibility for scheduling each semester.

Economic Analysis: There are no additional costs for the co-terminal program. It is expected that this co-terminal program will draw from a group of students separate from those who pursue the other ME co-terminal programs. Therefore, it is expected that additional tuition revenue will be generated equivalent to 24 credits/student enrolled in the program.

Graduate Program

Graduate Program: Master of Computational Engineering, Computational Mechanics Specialization

Program Overview: Students who thrive on solving complex equations and are energized by delving into computer simulations and mathematical algorithms would be a good fit for the Master of Computational Engineering program. This new and growing multidisciplinary field offers career possibilities ranging from calculating the trajectory of satellites to designing aircraft to simulating molecular mechanics. Students will learn computational methodologies, tools, analysis, processing, and modeling capabilities that are central to succeeding in this dynamic engineering field.

Program Justification: The Armour College of Engineering is committed to be a lifelong educational partner with our community, from pre-college to professional advancement. The MCE degree program contributes to this commitment by enhancing the overall offerings within the Armour College of Engineering. It is anticipated that approximately 20 students will enroll in the MCE program Fall 2018. The BS ME/MCE co-terminal degree is anticipated to add 2-6 additional students. A detailed justification for the MCE program can be found in the 2017 MCE degree application.

Program Resources: The co-terminal program does not require additional resources. The MCE curriculum leverages existing courses.

Program description: A detailed list of courses required for each track in the co-terminal degree follows. Students should have a minimum 3.0 GPA to be accepted into the co-terminal program. Students will be accepted into the program beginning Fall 2018.

Description of courses shared between Undergraduate and Graduate programs:

- a) Shared required courses: None
- b) Shared elective courses:
 - UG: (2) MMAE elective courses as GRAD: (2) Core, Track or Elective MMAE Course
- c) Course substitutions or exceptions: With advisor approval

Bachelor of Science in Mechanical Engineering/Master of Computational Engineering

Required Courses	Credit Hours		
	<i>UG</i>	<i>grad</i>	<i>total</i>
Mechanical Engineering Core Requirements MMAE 100, 200, 202, 232, 302, 305, 313, 319, 320, 321, 323, 332, 350, 419, 432 or 433, 443, 445, 485	56	0	56
Master of Computational Engineering Core Requirements^b (select 3 courses) ECE 505, ECE 511, MMAE 501, MMAE 502, MMAE 451, MMAE 532, CHE 506, CHE 536, MATH 577, MATH 581, BME 522, BME 553	3	9	9
Computational Mechanics Specialization^{a,b} (select 4 courses) MMAE 450, MMAE 517, MMAE 518, MMAE 570, MMAE 532, CAE 530, CAE 534 CAE 535, CAE 536, CHE 536, CHE 560, MMAE 597, CAE 597	3	12	12
Master of Computational Engineering Elective Requirements^b (select 3 courses) Additional courses from core or any specialization	0	9	9
Material Science Requirement MS 201	3	0	3
Physics Requirements PHYS 123, 221	8	0	8
Chemistry Requirements CHEM 124	4	0	4
Computer Science Requirements CS 104	2	0	2
Technical Elective^b (6 credits)	0	0	6
Free Elective (3 credits)	3	0	3
Mathematics Requirements MATH 151, MATH 152, MATH 251, MATH 252	18	0	18
Humanities and Social Science Requirements	21	0	21
I PRO	6	0	6
Total	127	30	151
(127 ME UG) + 30 (MCE) -6 (shared credits) = 151 (total)			

^aonly the Computational Mechanics Track applies to this co-terminal degree program

^bshared courses between undergraduate and graduate curricula (6 cr)

Any (2) Core, Track or Elective MMAE Course, will be count as electives for the UG program

Sample Schedule

Semester 1	Credits	Semester 2	Credits
MMAE 100	3	MS 201	3
MATH 151	5	MATH 152	5
CHEM 124	4	PHYS 123	4
Humanities 200- level	3	CS 104	2
		Social Science Elective	3
Total	15	Total	17
Semester 3	Credits	Semester 4	Credits
MMAE 200	3	MMAE 202	3
MMAE 232	3	MMAE 350	3
MATH 251	4	MATH 252	4
PHYS 221	4	Humanities Elective (300+)	3
Hum/SS Elective	3	Social Science Elective (300+)	3
Total	17	Total	16
Semester 5	Credits	Semester 6	Credits
MMAE 302	3	MMAE 319	4
MMAE 305	3	MMAE 321	3
MMAE 313	3	MMAE 323	3
MMAE 320	3	MMAE 332	3
Hum/SS Elective	3	Social Science Elective (300+)	3
Total	15	Total	16
Semester 7		Semester 8	
MMAE 419	4	MMAE 432 or 433	3
MMAE 443	3	MCE Core	3
MMAE 445	3	MCE Core	3
MCE Core	3	MCE Specialization	3
MCE Specialization	3		
Total	16	Total	12
Semester 9		Semester 10	
MMAE 445	3	I PRO II	3
MCE Specialization	3	MCE Specialization	3
MCE Elective	3	MCE Elective	3
I PRO Elective I	3	Free Elective	3
MCE Elective	3		
Total	15	Total	12