

Co-Terminal Degree Proposal, Form 802 Attachment

Bachelor of Science in Aerospace Engineering

Master of Engineering in Energy Systems

Undergraduate Program

Undergraduate Program Type: Bachelor of Science in Aerospace Engineering

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

Program Description: Aerospace engineering explores both the design and manufacture of aircraft, as well as the design and flight of vehicles beyond the earth's atmosphere. Knowledge of aerodynamics, structures and materials, propulsion systems, and flight mechanics and controls are important to this field. Aerospace engineers are primarily employed in civil aeronautics, the defense industry and the space program. However, applications of aerospace technology are also found in related areas such as ground and undersea transportation systems, pollution control, wind power and the effects of wind on structures, and the development and use of advanced materials.

Program Purpose: The co-terminal program between the BS in Aerospace Engineering and Master of Engineering in Energy systems (MES) allows students interested in energy system applications to enter the job force very competitively positioned to pursue these opportunities within energy-focused industries.

Program Benefits: The Master of Engineering in Energy systems 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 AE is a competitive degree offered by many institutions. However, most schools do not offer a co-terminal BS AE and engineering management.

Market Analysis: BS AE is a competitive degree offered by many institutions. The Master of Engineering in Energy systems is a new degree program (Fall 2017). Please refer to the market analysis for the MES 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 1-2 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 AE 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 Engineering in Energy systems

Program Overview: With its reputation as having the first microgrid energy-distribution system of its kind in the country, Illinois Tech is well equipped to prepare students to meet the challenges of generating, storing, and converting energy. Microgrid Design and Operation is one of the courses offered in the energy conservation and buildings specialty within the Master of Engineering in Energy Systems program. Two additional specialty tracks—energy generation and sustainability, and energy transmission and markets—are taught by faculty who have set the bar in energy systems and will empower students to become the next energy pioneers. This co-terminal degree plan applies to the (1) Energy Conservation and Buildings and (2) Energy Generation and Sustainability specializations only.

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 MES 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 MES program Fall 2018. The BS co-terminal degree is anticipated to add 1-2 additional students. A detailed justification for the MES program can be found in the 2017 MES degree application.

Program Resources: The co-terminal program does not require additional resources. The MES curriculum includes existing courses and a few new courses that will be developed according to program demand.

Program description: A detailed list of courses required for each track in the co-terminal degree follows. Students should have a 3.0 GPA in order 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 (2) GRAD: Core, Track or Elective MMAE Course

c) Course substitutions or exceptions:

Students are responsible for ensuring that any prerequisite courses are completed prior to enrolling in required courses in the co-terminal program of study.

Bachelor of Science in Aerospace Engineering

Required Courses

	Credit Hours		
	<i>UG</i>	<i>grad</i>	<i>total</i>
Aerospace Engineering Core Requirements	59	0	59
MMAE 100, 200, 202, 304, 305, 311, 312, 313, 315, 320, 350, 352, 372, 410, 411, 412, 414, 415, 443			
Master of Engineering in Energy systems Core Requirements (9 cr)	0	9	9
MMAE 522, CHE 543, ECE 418			
Energy Generation & Sustainability Specialization^{a, b} (select 4 courses min)	0	12	12
MMAE 425, 433, 453, 523, CHE 541, ECE 411, 412, 539, 552, 580			
Energy Conservation & Buildings Specialization^{a, b} (select 4 courses min)	0	12	12
CAE 513, 515, 526, CHE 541, ECE 580, 581, 581, MMAE 525			
Master of Engineering in Energy systems Electives^b (9 cr)	6	9	9
Additional courses from any specialization			
Material Science Requirement	3	0	3
MS 201			
Physics Requirements	8	0	8
PHYS 123, 221			
Chemistry Requirements	4	0	4
CHEM 124			
Computer Science Requirements	2	0	2
CS 104			
Technical Elective (3 credits)	0	0	3
Free Elective (3 credits)	0	0	3
Mathematics Requirements	18	0	18
MATH 151, MATH 152, MATH 251, MATH 252			
Humanities and Social Science Requirements	21	0	21
I PRO	6	0	6
Total	127	30	151
(127 AE UG) + 30 (MES) -6 (shared credits) = 151 (total)			

^aonly one track is required for the MES program

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

MMAE 433 and (1) MES course as an UG elective OR

(2) MES courses as (2) UG electives

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 251	4	MMAE 305	3
PHYS 221	4	MMAE 313	3
Hum/SS Elective	3	MMAE 320	3
Humanities Elective (300+)	3	MATH 252	4
Total	17	Total	16
Semester 5	Credits	Semester 6	Credits
MMAE 311	3	MMAE 304	3
MMAE 312	3	MMAE 352	3
MMAE 315	4	MMAE 372	3
MMAE 350	3	MMAE 443	3
Social Science Elective (300+)	3	Social Science Elective (300+)	3
Total	15	Total	16
Semester 7		Semester 8	
MMAE 410	4	MMAE 412	3
MMAE 411	3	MMAE 415	3
MMAE 414	3	CHE 543	3
ECE 418	3	MES Track	3
MMAE 522	3	MES Track	3
Total	16	Total	12
Semester 9		Semester 10	
IPRO Elective I	3	IPRO Elective II	3
MES Track	3	MES Elective	3
MES Elective	3	MES Track	3
MES Track	3	Social Science Elective (300+)	3
Total	12	Total	12