

Co-Terminal Degree Proposal, Form 802 Attachment

Bachelor of Science in Electrical Engineering
Master of Engineering in Advanced Manufacturing

Undergraduate Program

Undergraduate Program Type: Bachelor of Science in Electrical Engineering

Total Undergraduate Program Credit Hours (including shared credit): 131-134 hours

Program Description: Electrical engineering is concerned with the generation, transmission, and utilization of electrical energy and with the transmitting and processing of information. Electrical engineers are involved in the analysis, design, and production of electric power, radio, radar, television, computing, telecommunication, control, and information systems. These engineers find solutions to the challenging technical problems that arise in our rapidly changing society. They impact virtually every aspect of daily life, as evidenced by examples such as wireless communications, audio and video equipment, power distribution, computerized traffic control, noise pollution monitoring and abatement, and medical instrumentation.

Program Purpose: The co-terminal program between the BS in Electrical Engineering and Master of Engineering in Advanced Manufacturing (MAM) allows students interested in specialized areas of advanced manufacturing to enter the job force very competitively positioned to pursue these opportunities within manufacturing-based industries.

Program Benefits: The Master of Engineering in Advanced Manufacturing 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 EE is a competitive degree offered by many institutions. However, most schools do not offer a co-terminal BS EE and advanced manufacturing.

Market Analysis: BS EE is a competitive degree offered by many institutions. The Master of Engineering in Advanced Manufacturing is a new degree program (Fall 2017). Please refer to the market analysis for the MAM 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 EE 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 Advanced Manufacturing

Program Overview: Many companies in the automotive, aerospace, and chemical industries are advancing standard manufacturing practices to include innovative technology. In the Master of Engineering in Advanced Manufacturing program, students will explore the latest technologies, such as digital manufacturing and additive manufacturing, as well as learn more traditional hardware-based methodologies.

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 MAM 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 MAM program Fall 2018. The BS co-terminal degree is anticipated to add 2-6 additional students. A detailed justification for the MAM program can be found in the 2017 MAM degree application.

Program Resources: The co-terminal program does not require additional resources. The MAM 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: Apply (1) Professional ECE Elective as GRAD: ECE 505

UG: Select ECE 411, 412, and 438 as Professional ECE Electives; Apply (1) Elective
as GRAD: Core Requirement

c) Course substitutions or exceptions: None

Bachelor of Science in Electrical Engineering

Required Courses

	Credit Hours		
	<i>UG</i>	<i>grad</i>	<i>total</i>
Electrical Engineering Core Requirements ECE 100, 211, 213, 218, 242, 307, 308, 311, 312, 319	36	0	36
Master of Engineering in Advanced Manufacturing Core Requirements^b (12-14 cr) MMAE 546, 547, 557, 560, 544, MMAE 534/ ENGR 534, ECE 411, 412, 438, 505	6	6-8	12-14
<i>Digital Manufacturing Specialization^a</i> (select 9-10 cr) <i>MMAE 543, 545, 540, ECE 565, MMAE 587/ENGR 587, MMAE 539/ENGR 539</i>	0	9-10	9-10
<i>Additive Manufacturing Specialization^a</i> (select 9-10 cr) <i>MMAE 579, MMAE 588/ENGR 588, MMAE 572/ENGR 576</i>	0	9-10	9-10
<i>Automation and Control Systems Specialization^a</i> (select 9-10 cr) <i>ECE 437, 441, 481, 533, 535, 539, 540, 550, 551, 552, 549, 565</i>	0	9-10	9-10
Master of Engineering in Advanced Manufacturing Core Electives (6-9 cr) MMAE 451, 532, 570, 594, ENGR 595, ECE 594	0	6-9	6-9
Electrical and Computer Engineering Requirement ECE 211 or 218	3-4	0	3-4
Physics Requirements PHYS 123, 221, 224	11	0	11
Chemistry Requirements CHEM 122	3	0	3
Computer Science Requirements CS 115, 116	4	0	4
Professional ECE Elective^b	17-20	6	17-20
Technical Elective	3	0	3
Science Elective BIOL 105, 114, CHEM 126, MS 201	3	0	3
Engineering Science Requirement MMAE 200 or 320	3	0	3
Mathematics Requirements MATH 151, 152, 251, 252, 333, 374	24	0	24
Humanities and Social Science Requirements	21	0	21

IPRO	6	0	6
Total	131-134	30	155-158

$(131-134 \text{ EE UG}) + 30 \text{ (MAM)} - 6 \text{ (shared credits)} = 155-158 \text{ (total)}$

^aOnly one track is required for the MAM program

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

ECE 411, ECE 412 or ECE 438 as MAM Core

ECE 505 as UG Professional Elective

Sample Schedule

Semester 1	Credits	Semester 2	Credits
ECE 100	3	MATH 152	5
MATH 151	5	PHYS 123	4
CHEM 122	3	CS 116	2
CS 115	2	Science Elective	3
Humanities 200- level Course	3	Social Science Elective	3
Total	16	Total	17
Semester 3	Credits	Semester 4	Credits
MATH 252	4	MATH 251	4
PHYS 221	4	PHYS 224	3
ECE 211	3	ECE 213	4
ECE 218	4	ECE 242	3
		Social Science Elective (300+)	3
Total	15	Total	17
Semester 5	Credits	Semester 6	Credits
MATH 333	3	ECE 308	3
ECE 307	4	ECE 312	4
ECE 311	4	ECE 319	4
IPRO Elective I	3	MATH 374	3
Humanities Elective (300+)	3	Social Science Elective (300+)	3
Total	17	Total	17
Semester 7		Semester 8	
Professional ECE Elective	4	Professional ECE Elective	3-4
Technical Elective	3	MAM Track Elective	3
ECE 411 (MAM Core)	4	ECE 412 (MAM Core)	4
MAM Track Elective	3	ECE 438 (MAM Core)	3
Total	14	Total	13-14
Semester 9		Semester 10	
IPRO II	3	MMAE 200 or 320	3
Humanities Elective (300+)	3	MAM Elective	3
ECE 505 (MAM Core)	3	Professional ECE Elective	4
MAM Elective	4	Hum/ SS Elective	3
MAM Track Elective	3		
Total	16	Total	13