

MMAE Co-terminal Degrees Summary

Seeking Approval for Co-terminal Degrees within MMAE (note that no new degree programs are being proposed):

- BS Mechanical Engineering + MAS Mechanical and Aerospace Engineering
- BS Aerospace Engineering + MAS Mechanical and Aerospace Engineering
- BS Mechanical Engineering + MAS Materials Science and Engineering
- BS Aerospace Engineering + MAS Materials Science and Engineering

Advantages for Students:

- Maintain financial aid through completion of both bachelor's and master's degrees.
- Up to 9 credit hours can be shared between both degrees.
- Desirable alternative to double majors within MMAE.

Minimum Admission Requirements:

- 3.25 GPA at time of application.
- 60 credit hours of undergraduate study completed (24 at IIT).

Status:

- The co-terminal degree programs have been discussed at a MMAE faculty meeting during the fall 2012 semester and approved unanimously by MMAE faculty on January 11, 2013.
- The co-terminal degree programs have been discussed at an IIT Graduate Studies Committee meeting on February 22, 2013 with no major comments or revisions. The programs will be voted on in a subsequent meeting.

MMAE Co-terminal Degrees

Program Description:

The Mechanical, Materials, and Aerospace Engineering (MMAE) Department currently offers bachelor of science degrees in mechanical engineering, aerospace engineering, and materials science and engineering along with master of mechanical and aerospace engineering and master of materials science and engineering degrees. Because of the complementary nature of these degrees, it is very common for undergraduate students in the department to double major in two of the three bachelors degrees. Co-terminal degrees provide an attractive alternative that allows students to deepen their knowledge in their major area of study (mechanical or aerospace engineering) or complement it with a master's degree in materials science and engineering. These co-terminal degrees also address the increasing desire for engineers in related industries to have master's degrees. The four co-terminal degree programs are:

- BS Mechanical Engineering + MAS Mechanical and Aerospace Engineering
- BS Aerospace Engineering + MAS Mechanical and Aerospace Engineering
- BS Mechanical Engineering + MAS Materials Science and Engineering
- BS Aerospace Engineering + MAS Materials Science and Engineering

Both the BS in Mechanical Engineering and BS in Aerospace Engineering include two elective courses (two free electives or one free and one technical elective); therefore, co-terminal degree students will use these two electives to take courses that meet requirements toward the MAS degree. One additional 400-level required course from the BS degree will be allowed to count toward the MAS degree as well. In this way, there is no effect on the requirements for the bachelor's degrees. All four co-terminal degree programs can be completed in ten semesters of full-time study at IIT.

Program Benefits:

The co-terminal degrees offered in MMAE allow students to accelerate completion of the bachelors and masters degrees by taking advantage of the nine credit hours of courses that are shared between both degrees. In addition, students maintain their undergraduate status throughout completion of both degrees, thereby allowing them to continue financial aid throughout the five-year co-terminal degree program.

The undergraduate degree programs give students a broad background in mechanical or aerospace engineering. Meanwhile, the flexibility in the requirements for the MAS degrees allow for student's to pursue a focused specialization within mechanical and aerospace engineering or materials science and engineering as well as an interdisciplinary set of courses tailored to the student's interests.

Program Resources:

Because the subject co-terminal degrees are combinations of existing bachelors and masters of engineering degrees, no new resources in terms of faculty or facilities are required. There are no new courses that will need to be introduced. The only additional load on faculty will be in advising students interested in and pursuing the co-terminal degree programs; this will be handled primarily by the MMAE Associate Chair.

The MMAE department typically has approximately 30-40 students seeking double degrees. The majority of these students would be better served by pursuing one of the co-terminal degree programs. As not all such students will meet the admission requirements, we expect approximately 20-25 students to be pursuing the four co-terminal degrees on an ongoing basis.

Marketing and Advising:

The co-terminal degree programs will be marketed to prospective and current students in the following ways:

- 1) Highlighted at events for prospective students, e.g. open houses, "Meet Your Major" presentations, etc.
- 2) Current students will be informed of options for graduate study, including co-terminal degrees, through annual events held for MMAE students.
- 3) Individual advising sessions will address student-specific questions and issues that arise.

In addition to the student's undergraduate faculty advisor, the MMAE Associate Chair will coordinate specific advising related to the co-terminal degree requirements. We will proactively advise all of our undergraduate students to help them decide whether to seek a single BS degree, dual BS degrees, co-terminal degrees, or pursue MS/PhD.

Admission and Continuation Requirements:

Students pursuing a bachelor's degree in mechanical engineering or aerospace engineering are eligible to apply for either of the four co-terminal degree programs if they meet the following requirements:

- 1) Completed at least 60 credit hours of undergraduate study, of which 24 credit hours must have been completed at IIT.
- 2) Minimum cumulative GPA of 3.25 at time of application.

The application process is the same as that for all applicants to MAS programs within the department.

In order to maintain active status in the co-terminal degree programs, students must maintain a 3.0 cumulative GPA.

Program Details:

- BS ME/AE Requirements (118 credit hours)
- *MAS MAE or MSE Requirements (21 credit hours) - italicized*
- BS/MAS Requirements (9 credit hours) - underlined
- FE = Free Elective
- TE = Technical Elective
- Although 9 credit hours are shared between the BS and MAS degrees, only one required course for BS is counted toward the MAS. There are no effects on the BS degree requirements.
- MAE Core Courses (Defines Specialization):
 - MMAE 510 – Fundamentals of Fluid Mechanics
 - MMAE 525 – Fundamentals of Heat Transfer
 - MMAE 530 – Advanced Solid Mechanics
 - MMAE 541 – Advanced Dynamics
 - MMAE 545 – Advanced CAD/CAM
- Numerical Courses:
 - MMAE 450 – Computational Mechanics II
 - MMAE 451 – Finite-Element Methods
 - MMAE 517 – Computational Fluid Dynamics
 - MMAE 544 – Design Optimization
- Up to 9 (12) credit hours of shared and *MAS* courses can be 400-level for MAS MAE (MSE) degree.
- A project is optional, but not required, for the Master of engineering degrees in the MMAE Department.

BS Mechanical Engineering + MAS Mechanical & Aerospace Engineering

Semester 1:

MATH 151 – Calculus I
CHEM 123 – Principles of Chemistry I
MMAE 100 – ITP
HUM/SS Elective

Semester 2:

MATH 152 – Calculus II
PHYS 123 – General Physics I
CS 104 – Intro to Programming I
MS 201 – Materials Science
HUM/SS Elective

Semester 3:

MATH 251 – Calculus III
PHYS 221 – General Physics II
MMAE 200 – Intro. to Mechanics
MMAE 232 – Design for Innovation
HUM/SS Elective

Semester 4:

MATH 252 – Intro. Differential Eqns.
MMAE 202 – Mechanics of Solids II
MMAE 350 – Computational Mech.
HUM/SS Elective
HUM/SS Elective

Semester 5:

MMAE 302 – Mechanics of Solids III
MMAE 305 – Dynamics
MMAE 313 – Fluid Mechanics
MMAE 320 – Thermodynamics
HUM/SS Elective

Semester 6:

MMAE 319 – Mechanical Lab. I
MMAE 321 – Applied Thermo.
MMAE 323 – Heat & Mass Transfer
MMAE 332 – Dsgn. Machine Elements
HUM/SS Elective

Semester 7:

MMAE 419 – Mechanical Lab. II
MMAE 443 – Syst. Analysis & Control
MMAE 485 – Manufacturing Processes
IPRO 497 – IPRO I
MMAE 501 – Engr. Analysis I (FE)

Semester 8:

MMAE 432 – Dsgn. Mechanical Syst.
IPRO 497 – IPRO II
Graduate Elective
Graduate Elective

Semester 9:

MMAE 445 – CAD
MMAE 5xx – MAE Core Course
Graduate Elective
Graduate Elective

Semester 10:

MMAE 433 – Design Thermal Systems
MMAE 4/5xx – Numerical Course (FE)
Graduate Elective
Graduate Elective

127 BS + 30 MAS – 9 shared = 148 total credit hours

BS Aerospace Engineering + MAS Mechanical & Aerospace Engineering

Semester 1:

MATH 151 – Calculus I
CHEM 123 – Principles of Chemistry I
MMAE 100 – ITP
HUM/SS Elective

Semester 2:

MATH 152 – Calculus II
PHYS 123 – General Physics I
CS 104 – Intro to Programming I
MS 201 – Materials Science
HUM/SS Elective

Semester 3:

MATH 251 – Calculus III
PHYS 221 – General Physics II
MMAE 200 – Intro. to Mechanics
HUM/SS Elective
HUM/SS Elective

Semester 4:

MATH 252 – Intro. Differential Eqns.
MMAE 202 – Mechanics of Solids II
MMAE 305 – Dynamics
MMAE 313 – Fluid Mechanics
MMAE 320 – Thermodynamics

Semester 5:

MMAE 311 – Compressible Flow
MMAE 312 – Aerodynamics
MMAE 315 – Aero. Lab. I
MMAE 350 – Computational Mech.
HUM/SS Elective

Semester 6:

MMAE 304 – Mech. Aerostructures
MMAE 372 – Aerospace Materials
MMAE 443 – Syst. Analysis & Control
MMAE 452 – Aerospace Propulsion
HUM/SS Elective

Semester 7:

MMAE 410 – Aircraft Flight Mechanics
MMAE 411 – Spacecraft Dynamics
IPRO 497 – IPRO I
MMAE 501 – Engr. Analysis I (FE)

Semester 8:

MMAE 415 – Aero. Lab. II
IPRO 497 – IPRO II
HUM/SS Elective
Graduate Elective
Graduate Elective

Semester 9:

MMAE 412/414 – Aero. Design I
MMAE 5xx – MAE Core Course
Graduate Elective
Graduate Elective

Semester 10:

MMAE 413/16 – Aero. Design II
MMAE 4/5xx – Numerical Course (TE)
Graduate Elective
Graduate Elective

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MATH 151 – Calculus I
CHEM 123 – Principles of Chemistry I
MMAE 100 – ITP
HUM/SS Elective

Semester 2:

MATH 152 – Calculus II
PHYS 123 – General Physics I
CS 104 – Intro to Programming I
MS 201 – Materials Science
HUM/SS Elective

Semester 3:

MATH 251 – Calculus III
PHYS 221 – General Physics II
MMAE 200 – Intro. to Mechanics
MMAE 232 – Design for Innovation
HUM/SS Elective

Semester 4:

MATH 252 – Intro. Differential Eqns.
MMAE 202 – Mechanics of Solids II
MMAE 350 – Computational Mech.
HUM/SS Elective
HUM/SS Elective

Semester 5:

MMAE 302 – Mechanics of Solids III
MMAE 305 – Dynamics
MMAE 313 – Fluid Mechanics
MMAE 320 – Thermodynamics
HUM/SS Elective

Semester 6:

MMAE 319 – Mechanical Lab. I
MMAE 321 – Applied Thermo.
MMAE 323 – Heat & Mass Transfer
MMAE 332 – Dsgn. Machine Elements
HUM/SS Elective

Semester 7:

MMAE 419 – Mechanical Lab. II
MMAE 443 – Syst. Analysis & Control
MMAE 485 – Manufacturing Processes
IPRO 497 – IPRO I
MMAE 470 – Intro. Polymer Science
(FE)

Semester 8:

MMAE 432 – Dsgn. Mechanical Syst.
IPRO 497 – IPRO II
Ceramics Elective (FE)
Graduate Elective

Semester 9:

MMAE 445 – CAD
MMAE 563 – Adv. Mech. Metallurgy
MMAE 569 – Adv. Phys. Metallurgy
Graduate Elective

Semester 10:

MMAE 433 – Design Thermal Systems
Graduate Elective
Graduate Elective
Graduate Elective

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MATH 151 – Calculus I
CHEM 123 – Principles of Chemistry I
MMAE 100 – ITP
HUM/SS Elective

Semester 2:

MATH 152 – Calculus II
PHYS 123 – General Physics I
CS 104 – Intro to Programming I
MS 201 – Materials Science
HUM/SS Elective

Semester 3:

MATH 251 – Calculus III
PHYS 221 – General Physics II
MMAE 200 – Intro. to Mechanics
HUM/SS Elective
HUM/SS Elective

Semester 4:

MATH 252 – Intro. Differential Eqns.
MMAE 202 – Mechanics of Solids II
MMAE 305 – Dynamics
MMAE 313 – Fluid Mechanics
MMAE 320 – Thermodynamics

Semester 5:

MMAE 311 – Compressible Flow
MMAE 312 – Aerodynamics
MMAE 315 – Aero. Lab. I
MMAE 350 – Computational Mech.
HUM/SS Elective

Semester 6:

MMAE 304 – Mech. Aerostructures
MMAE 372 – Aerospace Materials
MMAE 443 – Syst. Analysis & Control
MMAE 452 – Aerospace Propulsion
HUM/SS Elective

Semester 7:

MMAE 410 – Aircraft Flight Mechanics
MMAE 411 – Spacecraft Dynamics
IPRO 497 – IPRO I
MMAE 470 – Intro. Polymer Science
(FE)

Semester 8:

MMAE 415 – Aero. Lab. II
IPRO 497 – IPRO II
HUM/SS Elective
Ceramics Elective (TE)
Graduate Elective

Semester 9:

MMAE 412/414 – Aero. Design I
MMAE 472 – Adv. Aerospace Materials
MMAE 563 – Adv. Mech. Metallurgy
MMAE 569 – Adv. Phys. Metallurgy

Semester 10:

MMAE 413/16 – Aero. Design II
Graduate Elective
Graduate Elective
Graduate Elective

127 BS + 30 MAS – 9 shared = 148 total credit hours