

## MMAE Co-terminal Degrees Summary

Co-terminal Degrees within MMAE (MAS = master of engineering, i.e. non-thesis masters):

- 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:

- Complete bachelors and masters degrees in five years.
- Up to 9 credit hours can be shared between both degrees.
- It *may* be possible to maintain IIT financial aid through completion of both bachelor's and master's degrees (see IIT Financial Aid Office).
- Provides an attractive alternative to double majors within MMAE 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.

Minimum Admission Requirements:

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

## **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 can 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 may be able to maintain their undergraduate status throughout completion of both degrees, thereby possibly allowing them to continue IIT 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.

**Advising:**

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 (MMAE requirement).
- 2) Minimum cumulative GPA of 3.25 at time of application (IIT requirement).

Students may apply for the co-terminal degree programs through their my.iit.edu portal.

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 520 – Advanced Thermodynamics
  - 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 – Design 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 – Design Mechanical Systems  
OR MMAE 433 – Design Thermal Systems  
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 4/5xx – Numerical Course (FE)  
*Graduate Elective*  
*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 – Spacecraft Design I  
*MMAE 5xx – MAE Core Course*  
*Graduate Elective*  
*Graduate Elective*

### Semester 10:

MMAE 414 – Aircraft Design I  
MMAE 4/5xx – Numerical Course (TE)  
*Graduate Elective*  
*Graduate Elective*

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

## BS Mechanical Engineering + MAS Materials Science and 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 – Design 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 – Design Mechanical Systems  
OR MMAE 433 – Design Thermal Systems  
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:

*Graduate Elective*  
*Graduate Elective*  
*Graduate Elective*  
*Graduate Elective*

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## BS Aerospace Engineering + MAS Materials Science and 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 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 – Spacecraft Design I  
*MMAE 472 – Adv. Aerospace Materials*  
*MMAE 563 – Adv. Mech. Metallurgy*  
*MMAE 569 – Adv. Phys. Metallurgy*

### Semester 10:

MMAE 414 – Aircraft Design I  
*Graduate Elective*  
*Graduate Elective*  
*Graduate Elective*

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