

M. TECH. BULLETIN

2022 – 2023

**AEROSPACE ENGINEERING
DEPARTMENT**

IIT BOMBAY

(Updated 24th July, 2023)

COURSE CURRICULUM

The two-year M. Tech. programme in Aerospace Engineering has the following four specializations:

1. Aerodynamics (AE 1)
2. Dynamics & Control (AE 2)
3. Aerospace Propulsion (AE 3)
4. Aerospace Structures (AE 4)

The course curriculum for the first two semesters of M. Tech. programme is specific to each specialization, the details of which are given in the following pages. The third and fourth semesters are common to all specializations.

The core courses prescribed for the AE 1, AE 2, AE 3 and AE 4 specializations are listed in the Tables I(a)-(d), respectively.

Students have to take several elective courses as specified in Table I (viz. 6 for AE1, AE2 and AE3, but 4 for AE4), subject to the following rules (with none of the electives being repeated). The set of courses available for this appear in the separate ‘AE Electives’ document.

- Students may take all the requisite electives from the set of their specialization-specific options.
- However, students may choose to fulfil up to two of these elective requirements from the courses listed under any other M. Tech. specialization of the Aerospace Department (core or elective).
 - As a further flexibility, one of the two electives mentioned in the previous point can be chosen from any other course within the Institute in consultation with the Faculty Adviser.

All elective courses must be at least at the 400-level.

Apart from the above electives, students have to choose one “Institute elective” from the list provided by the institute at the beginning of the semester.

Moreover, students have to take a “Communication Skills” course that inculcates comprehension and articulation of technical material, and instils ethical practices in academia. A further compulsory “Seminar” course offers students the opportunity to practice these skills by undertaking a survey of a relevant topic under the guidance of a faculty member of the department. The seminar involves preparing a report and a presentation on the chosen topic.

The available elective courses as well as the contents of the departmental courses appear in separate documents.

Overview of Number of Courses and Credit Structure

Specializations: Aerodynamics (AE 1), Dynamics and Control (AE 2), Aerospace Propulsion (AE 3), Aerospace Structures (AE 4)

| Item | Number of Courses in Semesters | | | | Total Credits |
|---------------------------|--------------------------------|-------------------------------|--------------------------|--------------------------|------------------------------|
| | I | II | III | IV | |
| Core Courses | 3 (AE1, AE2, AE3), 4 (AE4) | 1 (AE1, AE2, AE3), 2 (AE4) | – | – | 24 (AE1, AE2, AE3), 36 (AE4) |
| Dept Electives | 1 (AE1, AE2, AE3), 0 (AE4) | 2 (AE1, AE2, AE3), 1 (AE4) | 2 | 1 | 36 (AE1, AE2, AE3), 24 (AE4) |
| Institute Elective | – | 1 | – | – | 6 |
| Lab. Course | 1 | – | – | – | 4 |
| Seminar | – | 1 | – | – | 4 |
| Communication | – | (+ 1) | – | – | (+ 6) ^{\$} |
| Total | 5 | 5 (+ 1) | 2 | 1 | 74 (+ 6) |
| M. Tech. Project | – | – | Stage I* (42 credits) | Stage II (42 credits) | 84 |
| Total Credits | 28 | 28 (+ 6) | 54 | 48 | 158 (+ 6) |

^{\$}P/NP (Credits only for load purposes)

*Students must register for Stage I of M. Tech. project in second semester (January)

| Table I(a) – Course Curriculum for M. Tech. Degree in Aerodynamics, AE 1 | | | | | | | | | | | |
|---|------------------------------------|------------------|---|---|--------------------|-------------|------------------------------|------------------|---|---|-----------|
| Semester I | | | | | Semester II | | | | | | |
| Course Code | Course Name | Credit Structure | | | | Course Code | Course Name | Credit Structure | | | |
| | | L | T | P | C | | | L | T | P | C |
| AE 705 | Introduction to Flight | 3 | 0 | 0 | 6 | AE 706 | Computational Fluid Dynamics | 3 | 0 | 0 | 6 |
| AE 707 | Aerodynamics of Aerospace Vehicles | 3 | 0 | 0 | 6 | AE 899 | Communication Skills* | 1 | 2 | 0 | 6* |
| AE 616 | Gas Dynamics | 3 | 0 | 0 | 6 | AE 694 | Seminar | 0 | 0 | 4 | 4 |
| AE 611 | Aerodynamics Lab | 0 | 0 | 4 | 4 | | Elective II | 3 | 0 | 0 | 6 |
| | Elective I | 3 | 0 | 0 | 6 | | Elective III | 3 | 0 | 0 | 6 |
| | | | | | | | Institute Elective | 3 | 0 | 0 | 6 |
| | Total | | | | 28 | | Total | | | | 34 |
| Semester III | | | | | Semester IV | | | | | | |
| Course Code | Course Name | Credit Structure | | | | Course Code | Course Name | Credit Structure | | | |
| | | L | T | P | C | | | L | T | P | C |
| AE 796 | M. Tech. Project - I | | | | 42 | AE 798 | M. Tech. Project - II | | | | 42 |
| | Elective IV | 3 | 0 | 0 | 6 | | Elective VI | 3 | 0 | 0 | 6 |
| | Elective V | 3 | 0 | 0 | 6 | | | | | | |
| | Total | | | | 54 | | Total | | | | 48 |
| Total Credit = 28 + 34 + 54 + 48 = 164 | | | | | | | | | | | |

* P/NP Course, credits only for load purposes

| Table I(b) – Course Curriculum for M. Tech. Degree in Dynamics & Control, AE 2 | | | | | | | | | | | |
|---|---|------------------|---|---|--------------------|-------------|--------------------------|------------------|---|---|-----------|
| Semester I | | | | | Semester II | | | | | | |
| Course Code | Course Name | Credit Structure | | | | Course Code | Course Name | Credit Structure | | | |
| | | L | T | P | C | | | L | T | P | C |
| AE 705 | Introduction to Flight | 3 | 0 | 0 | 6 | AE 717 | Aircraft Flight Dynamics | 3 | 0 | 0 | 6 |
| AE 775 | System Modelling, Dynamics and Control | 3 | 0 | 0 | 6 | AE 899 | Communication Skills* | 1 | 2 | 0 | 6* |
| AE 695 | State Space Methods for Flight Vehicles | 3 | 0 | 0 | 6 | AE 694 | Seminar | 0 | 0 | 4 | 4 |
| AE 699 | Control System Lab | 0 | 0 | 4 | 4 | | Elective II | 3 | 0 | 0 | 6 |
| | Elective I | 3 | 0 | 0 | 6 | | Elective III | 3 | 0 | 0 | 6 |
| | | | | | | | Institute Elective | 3 | 0 | 0 | 6 |
| | Total | | | | 28 | | Total | | | | 34 |
| Semester III | | | | | Semester IV | | | | | | |
| Course Code | Course Name | Credit Structure | | | | Course Code | Course Name | Credit Structure | | | |
| | | L | T | P | C | | | L | T | P | C |
| AE 796 | M. Tech. Project - I | | | | 42 | AE 798 | M. Tech. Project - II | | | | 42 |
| | Elective IV | 3 | 0 | 0 | 6 | | Elective VI | 3 | 0 | 0 | 6 |
| | Elective V | 3 | 0 | 0 | 6 | | | | | | |
| | Total | | | | 54 | | Total | | | | 48 |
| Total Credit = 28 + 34 + 54 + 48 = 164 | | | | | | | | | | | |

* P/NP Course, credits only for load purposes

| Table I(c) – Course Curriculum for M. Tech. Degree in Propulsion, AE 3 | | | | | | | | | | | |
|---|------------------------------------|------------------|---|---|--------------------|-------------|-----------------------|------------------|---|---|-----------|
| Semester I | | | | | Semester II | | | | | | |
| Course Code | Course Name | Credit Structure | | | | Course Code | Course Name | Credit Structure | | | |
| | | L | T | P | C | | | L | T | P | C |
| AE 705 | Introduction to Flight | 3 | 0 | 0 | 6 | AE 708 | Aerospace Propulsion | 3 | 0 | 0 | 6 |
| AE 707 | Aerodynamics of Aerospace Vehicles | 3 | 0 | 0 | 6 | AE 899 | Communication Skills* | 1 | 2 | 0 | 6* |
| AE 711 | Aircraft Propulsion | 3 | 0 | 0 | 6 | AE 694 | Seminar | 0 | 0 | 4 | 4 |
| AE 607 | Aircraft Propulsion Lab | 0 | 0 | 4 | 4 | | Elective II | 3 | 0 | 0 | 6 |
| | Elective I | 3 | 0 | 0 | 6 | | Elective III | 3 | 0 | 0 | 6 |
| | | | | | | | Institute Elective | 3 | 0 | 0 | 6 |
| | Total | | | | 28 | | Total | | | | 34 |
| Semester III | | | | | Semester IV | | | | | | |
| Course Code | Course Name | Credit Structure | | | | Course Code | Course Name | Credit Structure | | | |
| | | L | T | P | C | | | L | T | P | C |
| AE 796 | M. Tech. Project - I | | | | 42 | AE 798 | M. Tech. Project - II | | | | 42 |
| | Elective IV | 3 | 0 | 0 | 6 | | Elective VI | 3 | 0 | 0 | 6 |
| | Elective V | 3 | 0 | 0 | 6 | | | | | | |
| | Total | | | | 54 | | Total | | | | 48 |
| Total Credit = 28 + 34 + 54 + 48 = 164 | | | | | | | | | | | |

* P/NP Course, credits only for load purposes

| Table I(d) – Course Curriculum for M. Tech. Degree in Structures, AE 4 | | | | | | | | | | | |
|---|-----------------------------------|------------------|---|---|--------------------|-------------|-----------------------|------------------|---|---|-----------|
| Semester I | | | | | Semester II | | | | | | |
| Course Code | Course Name | Credit Structure | | | | Course Code | Course Name | Credit Structure | | | |
| | | L | T | P | C | | | L | T | P | C |
| AE 705 | Introduction to Flight | 3 | 0 | 0 | 6 | AE 678 | Aero-elasticity | 3 | 0 | 0 | 6 |
| AE 709 | Aerospace Structures | 3 | 0 | 0 | 6 | AE 649 | Finite Element Method | 3 | 0 | 0 | 6 |
| AE 715 | Structural Dynamics | 3 | 0 | 0 | 6 | AE 899 | Communication Skills* | 1 | 2 | 0 | 6* |
| AE 673 | Fibre Reinforced Composites | 3 | 0 | 0 | 6 | AE 694 | Seminar | 0 | 0 | 4 | 4 |
| AE 727 | Aircraft Structural Mechanics Lab | 0 | 0 | 4 | 4 | | Elective I | 3 | 0 | 0 | 6 |
| | | | | | | | Institute Elective | 3 | 0 | 0 | 6 |
| | Total | | | | 28 | | Total | | | | 34 |
| Semester III | | | | | Semester IV | | | | | | |
| Course Code | Course Name | Credit Structure | | | | Course Code | Course Name | Credit Structure | | | |
| | | L | T | P | C | | | L | T | P | C |
| AE 796 | M. Tech. Project - I | | | | 42 | AE 798 | M. Tech. Project - II | | | | 42 |
| | Elective IV | 3 | 0 | 0 | 6 | | Elective VI | 3 | 0 | 0 | 6 |
| | Elective V | 3 | 0 | 0 | 6 | | | | | | |
| | Total | | | | 54 | | Total | | | | 48 |
| Total Credit = 28 + 34 + 54 + 48 = 164 | | | | | | | | | | | |

* P/NP Course, credits only for load purposes

Document History

2023-07-24: Modified elective rules statement to accord with new ‘AE Electives’ document
2022-12-13: Included missing AE4 curriculum (Table I(d))
2022-06-09: First version