

Course Curriculum
For
B. Tech. (Aerospace Engineering)



**Department of Mechanical and Aerospace
Engineering
National Institute of Technology Delhi**

**w.e.f. the Academic Year
2024-2025**

**Vision and Mission of the Institute
National Institute of Technology Delhi**

VISION

Committed to holistic development of Lives and Society by imparting Knowledge of Science and Technology and Crystallizing the future.

MISSION

Application of Knowledge through learning and inculcating Research Oriented mindset towards Design and Innovative Development for Realistic Societal Solutions.

Department of Mechanical and Aerospace Engineering

National Institute of Technology Delhi

1.1 About the Department

Welcome to the Department of Mechanical and Aerospace Engineering at NIT Delhi. Aerospace Engineering is a diverse field, which involves Unmanned Aerial Vehicles (UAVs), Aeroacoustics, Green Aviation, Aircraft Safety, Space Exploration, Design, Analysis and Manufacturing from small machine parts and devices to large systems. Department is committed to disseminate the advanced engineering education and pursues success in research as well. Department is dedicated to preparing students to face the emerging challenges facing by society. The program is going to be start from academic session 2024-25.

The Department's dream is to translate its research and to develop teaching methods so that the underprivileged minds can find technological solutions to future challenges. Students also have the opportunity to work with professionals from various fields in emerging areas such as Internet of Things (IoT), Machine Learning (ML), Smart Healthcare, and Artificial Intelligence (AI), Digital Manufacturing, Mechatronics etc.

1.2 Vision

To be a world class educational and research institution contributing significantly to the Space endeavors.

1.3 Mission

- Create a unique learning environment enriched by the challenges of the Space Programme.
- Nurture the spirit of innovation and creativity.
- Provide ethical and value based education.
- Promote activities to address societal needs.

B. Tech. (Aerospace Engineering)

2.1 Preamble

B. Tech. (Aerospace Engineering) program offered at NIT Delhi is designed to equip students with a unique blend of skill sets that include:

- Strong theoretical foundation
- Predominantly practice-oriented approach with access to well-equipped and specialized laboratories, and supervised internship via the Practice School
- Hands-on technical training
- Life skills orientation
- Hard and soft skills
- Business perspective, along with emphasis on innovation and entrepreneurship
- Specialized courses in advanced areas such as Robotics, Mechatronics, Flight Mechanics, Space Dynamics, etc.

2.2 Salient Features:

- Minimum Credits requirements for completion of BTech program is 160.
- The Curriculum is based on the guidelines of National Education Policy (NEP) – 2020.
- The curriculum has embedded the Multi Exit/ Multi Entry in the BTech program.
- There is provision of Major degree and Minor Degree for students.
- The curriculum is designed to meet the prevailing and ongoing industrial requirements.
- The curriculum includes Project based Education with Projects every year.
- The curriculum is flexible and offers Choice Based Credit System (CBCS).
- The curriculum inherits the Value based Education and offers Interdisciplinary/ Multidisciplinary Courses.
- The Curriculum offers Digital Pedagogy & Flipped Learning with adequate motivation for Entrepreneurship/ Startups.
- The curriculum aims the Holistic Development of the students.

2.3 Cardinal Mentions:

- ✓ Students exiting after completing 1st Year, 2nd Year and 3rd Year will be awarded Certificate, Diploma and Advanced Diploma in Aerospace Engineering respectively. A minimum Credit requirement for Certificate is 40 Credits, Diploma is 80 Credits and Advanced Diploma is 120 Credits respectively.
- ✓ The students can opt for Minor Degree across any specialization offered in the Institute from 5th Semester e.g. a student pursuing B. Tech. (Aerospace Engineering) may opt for Minor Degrees like Artificial Intelligence, Machine Learning, Data Sciences, Communication, VLSI etc. offered by the different Departments in the Institute depending upon his/her interest.
- ✓ The students opting for Minor Degree will have to earn addition credits for the Minor Degree as per Institute norms which may vary from time to time.

Program Educational Objectives (PEOs)

PEO-1	Analyze the complex systems with the help of aerospace engineering, and allied engineering concepts by applying mathematics and sciences.
PEO-2	Demonstrate multi-disciplinary knowledge and skills to analyze, interpret and create solutions to real-life aerospace engineering problems.
PEO-3	Embrace capability to expand horizons beyond engineering for creativity, innovation and entrepreneurship.
PEO-4	Imbibe competence and ethics for social and environmental sustainability with a focus on the welfare of humankind.

Program Outcomes (POs) of B. Tech (Aerospace Engineering)

PO-1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO-2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO-3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO-4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO-5	Modern Tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO-6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO-7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO-8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO-9	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

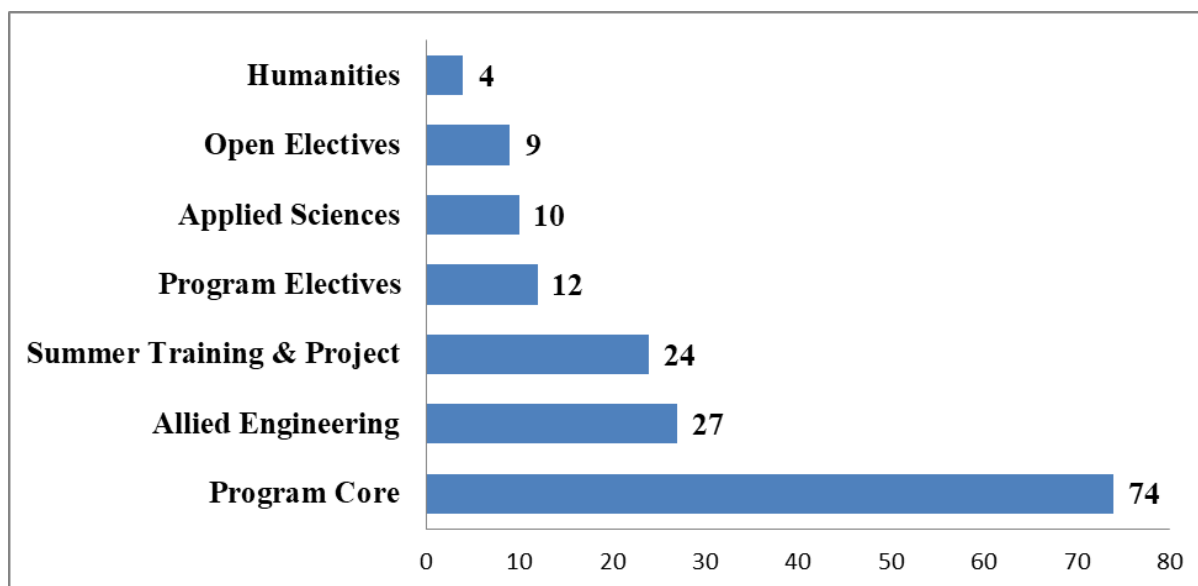
PO-10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO-11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO-12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course and Semester-wise Credits

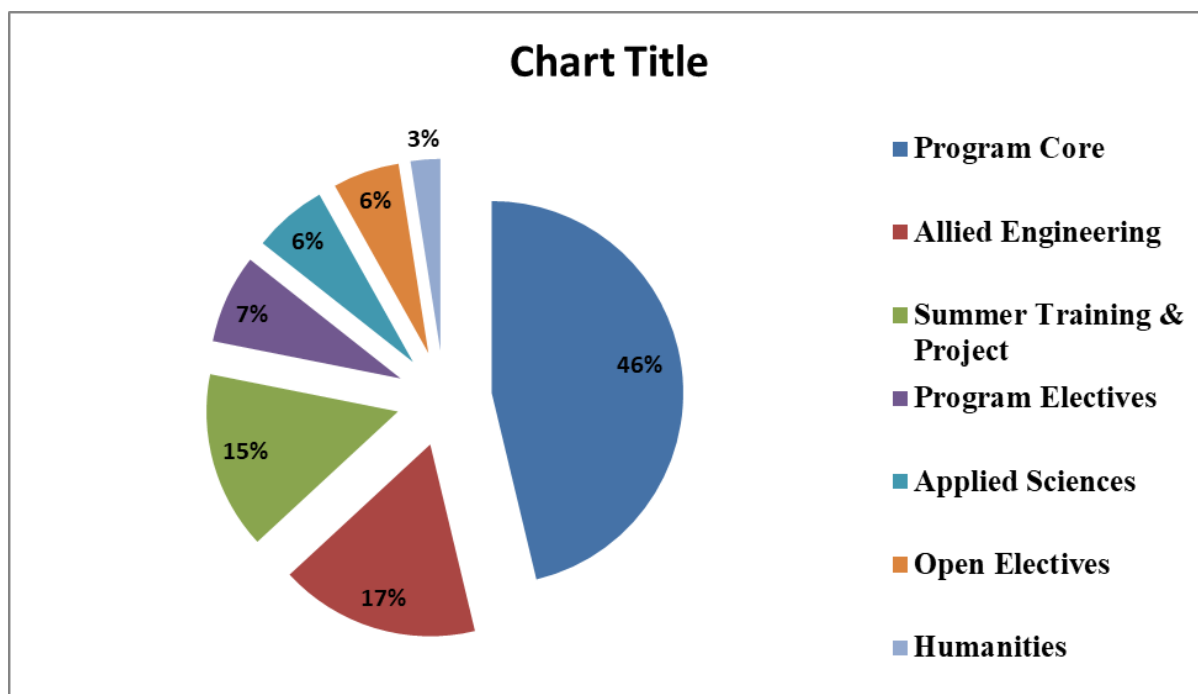
Sl. No.	Courses	Credits								Total
		1 st Year		2 nd Year		3 rd Year		4 th Year		
		1 st Sem.	2 nd Sem.	3 rd Sem.	4 th Sem.	5 th Sem.	6 th Sem.	7 th Sem.	8 th Sem.	
1	Program Core	3	4	16	18	15	15	3		86
2	Program Electives						3	6	3	12
3	Open Electives							6	3	9
4	Applied Sciences	7		3						13
5	Humanities	3	1							4
6	Summer Training & Project		2	1	2	1	2	2	14	23
7	Allied Engineering	7	13			4		3		13
Total		20	20	20	20	20	20	20	20	160

Credits Distribution among Different Courses Categories

I.



II. Percentage (%) Credit Distribution among Different Courses Categories



4.1 Course Scheme

SEMESTER – I

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	MALB 101	Engineering Mathematics-I	3	3	3	0	0	3
2	PHBB 111	Engineering Physics-I	3+1	4	3	0	2	4
3	EEBB 161	Introduction to Electrical & Electronics Engineering	3+1	4	3	0	2	4
4	HMLB 101	Communication Skills	2	2	2	0	0	2
5	AELB 111	Introduction to Aerospace Engineering	3	3	3	0	0	3
6	MELB 101	Introduction to Sensors, Actuators & IoT	2	2	2	0	0	2
7	MEXX 122	Workshop Practice	1	1	0	0	2	1
8	HSPB 150	Holistic Health & Sports	1	1	0	0	2	1
		Total	16+4	20	16	0	8	20

SEMESTER – II

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	AELB 161	Aerospace Materials & Processes	3+1	4	3	0	2	4
2	MEXX 151	Engineering Mechanics	3	3	3	0	0	3
3	MEBB 162	Engineering Graphics and Drawing	3+1	4	3	0	2	4
4	CELB XXX	Environmental Studies	2	2	3	0	0	3
5	CELB 101	Computer Programming	2+1	3	2	0	2	3
6	HMPB 171	Technical Report Writing	0+1	1	0	0	2	1
7	AEPB 171	Project-I	2	2	0	0	0	2
		Total	14+6	20	14	0	8	20

NOTE: Summer Training (6-8 Weeks) is mandatory for each student to continue the program and their evaluation will be done in the Semester-III.

SEMESTER – III

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	MALB 201	Engineering Mathematics-II	3	3	3	0	0	3
2	AEBB 211	Fluid Statics and Dynamics	3+1	4	3	0	2	4
3	AELB 201	Thermodynamics for Aerospace Engineering	3	3	3	0	0	3
4	AEBB 212	Aerospace Manufacturing Engineering Technology	3+1	3	3	0	3	4
5	AEPB 211	Computer Aided Aircraft Drawing	1	1	0	0	2	1
7	AEBB 213	Metrology & Computer Aided Inspection	3+1	4	3	0	2	4
8	AEPB 223	Summer Training- I	1	1	0	0	0	1
	Total		15+5	20	15	0	8	20

SEMESTER – IV

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	AEBB 261	Aerospace Propulsion	3+1	4	3	0	2	4
2	AELB 251	Heat Transfer	3	3	3	0	0	3
3	AELB 252	Mechanics of Solids	3	3	3	0	0	3
4	AELB 253	Aerodynamics	3	3	3	0	0	3
5	AEBB 262	Aerospace Structures	3+1	4	3	0	2	4
6	AEPB 271	Unmanned Aerial Vehicles (UAV)	1	1	0	0	2	1
7	AEXX 272	Project-II	2	2	0	0	0	2
	Total		14+6	20	14	0	6	20

NOTE: Summer Training (6-8 Weeks) is mandatory for each student to continue the program and their evaluation will be done in the Semester-V.

SEMESTER – V

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	AEBB 311	Applied Dynamics and Vibration	3+1	4	3	0	2	4
2	AEBB 312	Flight Mechanics	3+1	3	3	0	2	4
3	AEBB 321	Spaceflight Mechanics	3	3	3	0	0	3
4	AEBB 313	Industrial Engineering & Management	3+1	4	3	0	2	4
5	EEBB 311	Control systems & Engineering	3+1	4	3	0	2	4
6	AEPB 321	Summer Training-II	1	1	0	0	0	1
	Total		15+5	20	15	0	8	20

SEMESTER – VI

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	AELB 351	Aviation Management	3	3	3	0	0	3
2	AEBB 361	Aircraft Design	3+1	4	3	0	2	4
3	AEBB 362	Avionics Systems	3+1	4	3	0	2	4
4	AEBB 363	Flight Dynamics	3+1	4	3	0	2	4
5	AELB 38X	Program Elective-1	3	3	3	0	0	3
6	AEPB 371	Project-III	2	2	0	0	0	2
	Total		15+5	20	15	0	6	20

NOTE: Summer Training (6 - 8 Weeks) is mandatory for each student to continue the program and their evaluation will be done in the Semester-VII.

SEMESTER –VII

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	AELB 401	Aviation Fuels and Combustion	3	3	3	0	0	3
2	CSLB 40X	Artificial Intelligence & Machine Learning	3	3	3	0	0	3
3	AELB 43X	Program Elective-2	3	3	3	0	0	3
4	AELB 43X	Program Elective-3	3	3	3	0	0	3
5	XXXXXX	Open Elective-1	3	3	3	0	0	3
6	XXXXXX	Open Elective-2	3	3	3	0	0	3
7	AEPB 421	Seminar	1	1	0	0	0	1
8	AEPB 422	Summer Training – III	1	1	0	0	0	1
	Total		18+2	20	18	0	0	20

SEMESTER – VIII

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	AELB 48X	MOOCs (Program Elective-4)	3	3	3	0	0	3
2	XXXXXX	MOOCs (Open Elective-3)	3	3	3	0	0	3
3	AEPB 471	Major Project	14	14	0	0	0	14
	Total		6+14	20	6	0	0	20

NOTE: MOOC's courses approved by the Department only be studied by the students.