

B.TECH. PROGRAMME

AEROSPACE ENGINEERING

CURRICULUM

for 2015 admissions onwards

CURRICULUM

B. Tech - Aerospace Engg.

2015 admissions onwards

GENERAL INFORMATION

Code Numbering:

Each course is assigned an 8-character Code number. The first two digits indicate the year of curriculum revision. The next three letters indicate the Department offering the course. The last three digits are unique to the course – the first digit indicates the level of the course (100, 200, 300, 400 etc.); the second digit indicates the type of the course, viz. 0, 1 and 2 indicate the core courses; 3,4,5,6 and 7 indicate the Elective courses; 8 indicates the Lab. or practical-based courses and 9 indicates Projects.

ABBREVIATIONS USED IN THE CURRICULUM:

Cat.	- Category;
L	- Lecture;
T	- Tutorial;
P	- Practicals;
Cr	- Credits;
ES	- Exam Slot;
ENGG.	- Engineering Sciences (including General, Core and Electives);
HUM	- Humanities (including Languages and others);
SCI	- Basic Sciences (including Mathematics);
PRJ	- Project Work (including Seminars).

Departments

AES	- Aerospace Engineering;
CHE	- Chemical Engineering;
CHY	- Chemistry;
CSE	- Computer Science and Engineering;
CUL	- Cultural Education;
CVL	- Civil Engineering;
ECE	- Electronics and Communication Engineering;
EEE	- Electrical and Electronics Engineering;
EIE	- Electronics and Instrumentation Engineering;
HUM	- Humanities and Languages;
MAT	- Mathematics;
MEC	- Mechanical Engineering;
PHY	- Physics;
SWK	- Social Work.

Category-wise distribution of credits for B Tech Aerospace Engineering programme:

Humanities - 22 credits; Basic Sciences - 30 credits;
Engineering Sciences - 100 credits; Project Work - 2 credits. **Total = 164 Credits**

Semester I

Cat.	Code	Course Title	L-T-P	Cr	ES
HUM	15ENG111	Communicative English	2 0 2	3	A
SCI	15MAT111	Calculus and Matrix Algebra	2 1 0	3	B
ENGG	15CSE100	Computational Thinking and Problem Solving	3 0 2	4	D
SCI	15PHY100/ 15CHY100	Physics / Chemistry	3 0 0	3	C
SCI	15PHY181/ 15CHY181	Physics Lab. / Chemistry Lab.	0 0 2	1	L1
ENGG	15MEC180/ 15EEE180	Workshop A/ Workshop B	0 0 2	1	L2
ENGG	15MEC100	Engineering Drawing - CAD	2 0 2	3	E
HUM	15CUL101	Cultural Education I	2 0 0	2	F
Total			20		

Semester II

Cat.	Code	Course Title	L-T-P	Cr	ES
SCI	15MAT121	Vector Calculus and Ordinary Differential Equations	3 1 0	4	B
SCI	15CHY100/ 15PHY100	Chemistry/ Physics	3 0 0	3	C
ENGG	15CSE102	Computer Programming	3 0 0	3	D
ENGG	15MEC102	Engineering Mechanics	3 0 0	3	E
ENGG	15AES111	Introduction to Aerospace Technology	3 0 0	3	A
SCI	15CHY181/ 15PHY181	Chemistry Lab. / Physics Lab.	0 0 2	1	L1
ENGG	15EEE180/ 15MEC180	Workshop B/ Workshop A	0 0 2	1	L2
ENGG	15CSE180	Computer Programming Lab.	0 0 2	1	L3
HUM	15CUL111	Cultural Education II	2 0 0	2	F
Total			21		

Semester III

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15AES201	Mechanics of Fluids	3 1 0	4	A
ENGG	15AES202	Introduction to Thermodynamics	2 1 0	3	C
ENGG	15AES203	Mechanics of Materials	2 1 0	3	D
ENGG	15AES204	Materials for Aviation and Space	3 0 0	3	E
SCI	15MAT204	Transforms and Partial Differential Equations	2 1 0	3	B
SCI		Science Elective I	2 1 0	3	G
HUM		Humanities Elective I		2	H
ENGG	15AES281	Measurement and Instrumentation Lab.®	0 0 2	1	L1
HUM	15AVP201	Amrita Values Programme I	1 0 0	1	F
Total			23		

Semester IV

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15AES211	Aerodynamics I	3 0 0	3	A
ENGG	15AES212	Compressible Fluid Flow	2 1 0	3	C
ENGG	15AES213	Aerospace Structures I	3 0 0	3	D
ENGG	15AES214	Introduction to Control Theory	2 1 0	3	E
SCI	15MAT211	Calculus of Variations and Numerical Methods	2 1 0	3	B
HUM		Humanities Elective II		2	H
ENGG	15AES285	Mechanics of Fluids Lab.	0 0 2	1	L1
ENGG	15AES286	Materials Testing Lab.®	0 0 2	1	L2
HUM	15SSK221	Soft Skills I	1 0 2	2	G
HUM	15AVP211	Amrita Values Programme II	1 0 0	1	F
Total			22		

® 'Hands-on' Project-based Lab.

Semester V

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15AES301	Aerodynamics II	2 1 0	3	A
ENGG	15AES302	Aerospace Propulsion	2 1 0	3	C
ENGG	15AES303	Aerospace Structures II	3 0 0	3	D
ENGG	15AES304	Avionics	3 0 0	3	F
SCI	15MAT202	Linear Algebra	2 1 0	3	B
ENGG		Elective I*	3 0 0	3	E
ENGG	15AES381	Aero-structures Lab.®	0 0 2	1	L1
ENGG	15AES382	Avionics Lab.®	0 0 2	1	L2
HUM	15SSK321	Soft Skills II	1 0 2	2	G
ENGG	15AES390	Live-in-Lab**		[3]	P2
Total			22	[+3]	

Semester VI

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15AES311	Finite Element Methods for Aerospace	2 1 0	3	A
ENGG	15AES312	Flight Mechanics	2 1 0	3	B
HUM	15ENV300	Environmental Science and Sustainability	3 0 0	3	C
ENGG		Elective II*	3 0 0	3	E
SCI		Science Elective II	3 0 0	3	H
ENGG	15AES383	Propulsion Lab.®	0 0 2	1	L1
ENGG	15AES384	Low-speed Aerodynamics Lab.®	0 0 2	1	L2
ENGG	15AES385	Innovations Lab.	0 0 2	1	L3
HUM	15SSK331	Soft Skills III	1 0 2	2	G
Total			20		

® 'Hands-on' Project-based Lab.

* A maximum of One Elective course can be chosen from the Electives prescribed for other Branches or from under Science Electives.

** Students undertaking and registering for a Live-in-Lab project, can be exempted from registering for an Elective course in the higher semester.

Semester VII

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15AES401	Computational Fluid Dynamics for Aerospace	2 1 0	3	A
ENGG	15AES402	Aero Design	2 2 2	5	B
ENGG	15AES403	Flight Dynamics and Control	3 0 0	3	C
ENGG		Elective III*	3 0 0	3	E
ENGG		Elective IV*	3 0 0	3	D
ENGG	15AES481	UAV Lab.®	0 0 2	1	L1
PRJ	15AES495	Project Phase I		2	P1
ENGG	15AES490	Live-in-Lab**		[3]	P2
Total			20	[+3]	

Semester VIII

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG		Elective V*	3 0 0	3	E
ENGG		Elective VI*	3 0 0	3	D
PRJ	15AES499	Project Phase II		10	P
Total			16		

TOTAL 164

® 'Hands-on' Project-based Lab.

* A maximum of One Elective course can be chosen from the Electives prescribed for other Branches or from under Science Electives.

** Students undertaking and registering for a Live-in-Lab project, can be exempted from registering for an Elective course in the higher semester.

ELECTIVES**Elective I**

- 15AES332 Fundamentals of Heat Transfer
 15AES352 Vibration Analysis
 15AES372 Manufacturing Processes

Elective II

- 15AES342 Experimental Aerodynamics
 15AES353 Composite Materials and Mechanics
 15AES373 Advanced Avionics

Elective III

- 15AES432 Air Breathing Engines
 15AES452 Engineering Fracture Mechanics
 15AES462 Helicopter Theory

Elective VI

- 15AES430 Rocket and Spacecraft Propulsion ^(o)
 15AES442 Hypersonic Flow Theory
 15AES453 Aero-Elasticity
 15AES454 Advanced Composite Structures
 15AES470 State Space Techniques ^(o)

Elective V

- 15AES440 Turbulent Flows ^(o)
 15AES460 Space Flight Mechanics ^(o)
 15AES471 Multidisciplinary Design Optimization ^(o)

Elective VI

- 15AES441 Advanced Computational Fluid Dynamics ^(o)
 15AES450 Surface Engineering, Coating and Joining Technologies ^(o)
 15AES461 Principles of Airport Management ^(o)

^(o) indicates Open electives which can be taken by students of other branches.

SCIENCE ELECTIVES (3 0 0 3)

- 15CHY231 Advanced Polymer Chemistry
 15CHY232 Biomaterials Science
 15CHY233 Catalytic Chemistry
 15CHY234 Chemistry of Advanced Materials
 15CHY235 Chemistry of Engineering Materials
 15CHY236 Chemistry of Nanomaterials
 15CHY237 Chemistry of Toxicology
 15CHY238 Colloidal and Interfacial Chemistry
 15CHY239 Computational Chemistry and Molecular Modelling
 15CHY241 Electrochemical Energy Systems and Processes
 15CHY242 Environmental Chemistry
 15CHY243 Fuels and Combustion
 15CHY244 Green Chemistry and Technology
 15CHY245 Instrumental Methods of Analysis
 15CHY246 Medicinal Organic Chemistry
 15CHY247 Modern Polymer Composites
 15CHY248 Organic Reaction Mechanisms
 15CHY249 Organic Synthesis and Stereochemistry
 15CHY250 Polymer Materials and Properties
 15CHY251 Polymers for Electronics
 15CHY252 Solid State Chemistry
 15CHY331 Batteries and Fuel Cells
 15CHY332 Corrosion Science
 15PHY230 Advanced Classical Dynamics
 15PHY233 Biophysics and Biomaterials
 15PHY234 Introduction to Computational Physics
 15PHY238 Electrical Engineering Materials
 15PHY239 Electromagnetic Fields and Waves
 15PHY240 Electronic Material Sciences
 15PHY241 Lasers in Material Processing

15PHY243	Microelectronic Fabrication	
15PHY245	Nuclear Energy – Principles and Applications	
15PHY247	Photovoltaics	
15PHY248	Physics of Lasers and Applications	
15PHY250	Quantum Physics and Applications	
15PHY251	Thin Film Physics	
15PHY331	Astronomy	
15PHY333	Concepts of Nanophysics and Nanotechnology	
15PHY335	Medical Physics	
15PHY338	Physics of Semiconductor Devices	
15PHY532	Astrophysics	
15PHY535	Earth's Atmosphere	
15PHY536	Earth's Structure and Evolution	
15PHY540	Nonlinear Dynamics	
15PHY542	Optoelectronic Devices1	

HUMANITIES ELECTIVES

15CUL230	Achieving Excellence in Life - An Indian Perspective	2 0 0 2
15CUL231	Excellence in Daily Life	2 0 0 2
15CUL232	Exploring Science and Technology in Ancient India	2 0 0 2
15CUL233	Yoga Psychology	2 0 0 2
15ENG230	Business Communication	1 0 2 2
15ENG231	Indian Thought through English	1 0 2 2
15ENG232	Insights into Life through English Literature	1 0 2 2
15ENG233	Technical Communication	1 0 2 2
15ENG234	Indian Short Stories in English	1 0 2 2
15FRE230	Proficiency in French Language (Lower)	1 0 2 2
15FRE231	Proficiency in French Language (Higher)	1 0 2 2
15GER230	German for Beginners I	1 0 2 2
15GER231	German for Beginners II	1 0 2 2
15GER232	Proficiency in German Language (Lower)	1 0 2 2

15GER233	Proficiency in German Language (Higher)	1 0 2 2
15HIN101	Hindi I	1 0 2 2
15HIN111	Hindi II	1 0 2 2
15HUM230	Emotional Intelligence	2 0 0 2
15HUM231	Glimpses into the Indian Mind - the Growth of Modern India	2 0 0 2
15HUM232	Glimpses of Eternal India	2 0 0 2
15HUM233	Glimpses of Indian Economy and Polity	2 0 0 2
15HUM234	Health and Lifestyle	1 0 2 2
15HUM235	Indian Classics for the Twenty-first Century	2 0 0 2
15HUM236	Introduction to India Studies	2 0 0 2
15HUM237	Introduction to Sanskrit Language and Literature	2 0 0 2
15HUM238	National Service Scheme	2 0 0 2
15HUM239	Psychology for Effective Living	2 0 0 2
15HUM240	Psychology for Engineers	2 0 0 2
15HUM241	Science and Society - An Indian Perspective	2 0 0 2
15HUM242	The Message of Bhagwad Gita	2 0 0 2
15HUM243	The Message of the Upanishads	2 0 0 2
15HUM244	Understanding Science of Food and Nutrition	1 0 2 2
15JAP230	Proficiency in Japanese Language (Lower)	1 0 2 2
15JAP231	Proficiency in Japanese Language (Higher)	1 0 2 2
15KAN101	Kannada I	1 0 2 2
15KAN111	Kannada II	1 0 2 2
15MAL101	Malayalam I	1 0 2 2
15MAL111	Malayalam II	1 0 2 2
15SAN101	Sanskrit I	1 0 2 2
15SAN111	Sanskrit II	1 0 2 2
15SWK230	Corporate Social Responsibility	2 0 0 2
15SWK231	Workplace Mental Health	2 0 0 2
15TAM101	Tamil I	1 0 2 2
15TAM111	Tamil II	1 0 2 2