B.Tech. Programme

Aerospace Engineering

CURRICULUM

for 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.

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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.

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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