Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

School of Mechanical and Construction

Department of Aeronautical Engineering

Annexure I - Feedback on Curriculum Analysis – July 2024

Feedback on Program Outcomes for curriculum Revision:

	Percentage Scores & Recommendations														
Stake holder	Apply maths, science & aero	identity, formulate, literature	soln. to meet stds	exp.,interpret, synthesis	tool, software, algorithm	asses responsibility	impact on society & evs	norms / ethics	team play	communication & report	project 1mgt.	lifelong learn	design thinking	conceive ideas	implement, simulate, sense
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PS1**	**PS2**	**PS3**
Student	87	80	93	93	87	80	87	87	87	93	87	80	80	93	93
Employer	83	83	100	83	83	83	100	83	83	83	50	83	83	100	83
Alumni	72	72	72	89	78	89	89	89	94	83	78	89	72	72	89
Average	81	78	88	88	83	84	92	86	88	86	72	84	78	88	88
Inferences	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained; need improve.	Attained	Attained	Attained	Attained
Action											Orientation topics on projects shall added by PBL				

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Feedback on curriculum by various stakeholders:

Stakeholder	Observations of Feedback	Inferences	Action
Student	LSA, FM, TD, SM, EM, CFD, AD ASA, AP – Students felt time is not adequate to learn the topics	More number of numerical problems	Recommend to revisit the topics and be more focused towards outcome alone
Parent	Ethics and rules related to aero need to be added	Already available; need to provide awareness	Not required
Employer	Project management skills need to be improved; user defined functions in ansys;	Students need to be practiced on project management well before the major project.	Recommended to include structured PBL methodology in all courses.
Faculty	TD – time is not adequate to cover the syllabus. Need to include design and analysis tools in courses.	More number of numerical problems in TD Lack of tools in courses	Revisit the tutorial topics and keep them more focused. Include activity by using tools and conduct VAC on tools
Industry	ML, Composite manufacturing, DGCA certification process, rocket propulsion experiments, Testing of fixed wing Drones, mapping, xflr, catia like design and modelling tools	Lack of topics in drone applications Experiment related to rocket propulsion Lack of tools in course level Manufacturing topics is less	Include course on drone applications Experimental development initiation for rocket propulsion Include activity by using tools and conduct VAC on tools
Alumni	Improve communications, business management, tools related to design and analysis	Lack of tools in course level Lack of practice for communication aspects	Include activity by using tools and conduct VAC on tools PBL presentations – add importance for communication

Aero - Vel Tech - Feedback on Curriculum

Department of Aeronautical, Vel Tech (Deemed to be
University) invites you to help us to build industry specific, society relevant and futuristic curriculum
for our students! Kindly fill the below form to give your
valuable inputs!!! link for vision, mission, peo, po & syllabus: www
veltech.edu.in/aero
UG curriculum & syllabus : https://drive.google.com/drive/folders/1kdqhXF1mHycDIbSCu3jV-ru7U34p-MqM?usp=sharing
PG Curriculum & Syllabus : https://docs.google.com/document/d/1WvsO6wFtruAT4ZO1fhjSSymojQqUxz0_/edit?usp=sharing&ouid=116537144169323027827&rtpof=true&sd=true

* Indicates required question

1. Email *

2. Name *

3. Mobile Number

4. Designation *

5. Organization *

6. Kindly mention name of the inviter *

7. Giving suggestion for *

Mark only one oval.

- UG
- PG

8. Curriculum and syllabus of our department is *

Mark only one oval.

- Good
- Need improvements

9. Are you *

Mark only one oval.

- Employer / External project supervisor *Skip to question 10*
- Student *Skip to question 26*
- Alumni *Skip to question 41*
- Parent *Skip to question 56*
- Industry Expert *Skip to question 71*
- Academic Expert *Skip to question 74*
- Faculty at Vel Tech *Skip to question 77*

Employer / Ext. Project Supervisor - Vel Tech student Works / doing project in my organization

10. Students able to apply engineering knowledge to solve problems *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

11. Students able to analyze and provide solutions *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

12. Students able to design by considering needs of health & safety, cultural, societal, and environmental considerations *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

13. Students able to conduct investigations on selected problem definition *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

14. Students able to use latest tools, techniques in projects *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

15. Students able to identify and follow ethics, rules and regulations related to project *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

16. Students able to understand impact of solutions on environmental and provide sustainable solutions *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

17. Students able to follow norms of engineering practice (ex: ASTM, ISO) *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

18. Students able to demonstrate leadership and team play *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

19. Students able to communicate professionally *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

20. Students able to bargain, budgeting and follow principles project management *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

21. Students demonstrating life long learning skills (ex: online courses, learning required skills by own) *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

22. What skill set required for students. *

23. What tools required for students. *

24. Any specific topics required to be added to syllabus / as course *

25. Name of the student working / doing project *

Student - Presently pursuing education at vel tech

26. Students able to apply engineering knowledge to solve problems *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

27. Students able to analyze and provide solutions *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

28. Students able to design by considering needs of health & safety, cultural, societal, and environmental considerations *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

29. Students able to conduct investigations on selected problem definition *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

30. Students able to use latest tools, techniques in projects *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

31. Students able to identify and follow ethics, rules and regulations related to project *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

32. Students able to understand impact of solutions on environmental and provide sustainable solutions *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

33. Students able to follow norms of engineering practice (ex: ASTM, ISO) *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

34. Students able to demonstrate leadership and team play *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

35. Students able to communicate professionally *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

36. Students able to bargain, budgeting and follow principles project management *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

37. Students demonstrating life long learning skills (ex: online courses, learning required skills by own) *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

38. What courses you feel time is not enough to teach. *

39. What courses you feel content is large *

40. What courses you feel examination is tough *

Alumni of Vel Tech Aero

41. Students able to apply engineering knowledge to solve problems *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

42. Students able to analyze and provide solutions *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

43. Students able to design by considering needs of health & safety, cultural, societal, and environmental considerations *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

44. Students able to conduct investigations on selected problem definition *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

45. Students able to use latest tools, techniques in projects *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

46. Students able to identify and follow ethics, rules and regulations related to project *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

47. Students able to understand impact of solutions on environmental and provide sustainable solutions *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

48. Students able to follow norms of engineering practice (ex: ASTM, ISO) *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

49. Students able to demonstrate leadership and team play *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

50. Students able to communicate professionally *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

51. Students able to bargain, budgeting and follow principles project management *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

52. Students demonstrating life long learning skills (ex: online courses, learning required skills by own) *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

53. What skill set required for your entry level position at your organization *

54. What skill set required for your present designation *

55. Suggest us any tools and topics to be added as course and topics in syllabus *

Parent of Vel Tech Aero Student

56. Students able to apply engineering knowledge to solve problems *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

57. Students able to analyze and provide solutions *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

58. Students able to design by considering needs of health & safety, cultural, societal, and environmental considerations *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

59. Students able to conduct investigations on selected problem definition *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

60. Students able to use latest tools, techniques in projects *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

61. Students able to identify and follow ethics, rules and regulations related to project *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

62. Students able to understand impact of solutions on environmental and provide sustainable solutions *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

63. Students able to follow norms of engineering practice (ex: ASTM, ISO) *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

64. Students able to demonstrate leadership and team play *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

65. Students able to communicate professionally *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

66. Students able to bargain, budgeting and follow principles project management *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

67. Students demonstrating life long learning skills (ex: online courses, learning required skills by own) *

Mark only one oval.

- Strongly Agree
- Neutral
- Strongly disagree

68. What skill set required for your entry level position at your organization *

69. What skill set required for your present designation *

70. Suggest us any tools and topics to be added as course and topics in syllabus *

Industry Expert

71. Please list tools / software requires to join as entry level position at your organization *

72. Please list tools / software requires for your current position at your organization *

73. List any topics to be added to the syllabus or as course *

Academic Expert

74. Please list tools / software requires to join as entry level position at your organization *

75. Please list tools / software requires for your current position at your organization *

76. List any topics to be added to the syllabus or as course *

Faculty of Vel Tech

77. Courses you taught at Vel Tech *

78. Time is not adequate in below courses *

79. COs need to be modified in below courses *

80. Please list tools / software requires to join as entry level position *

81. Please list tools / software requires for mid level jobs *

82. List any topics to be added to the syllabus or as course *

Timestamp	Email Address	Name	Mobile Number	Designation	Organization	Curriculum and syllabus of our department is	Are you	What skill set required for your entry level position at your organization	What skill set required for your present designation
7-17-2024 16.35.52	vtu18323@veltech.edu.in	Ch Sravanth Kumar	9849713121	Student	Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Sciecne and Technology	Need improvements	Alumni	Nil	Nil
7-18-2024 9.31.29	aeror.naveen@gmail.com	Dr. Naveen R	9790796094	ASP	KCG COLLEGE OF TECH	Good	Alumni	Communication and technical	Drone technology
7-21-2024 22.59.26	aakashmandvekar@gmail.com	Aakash Kiran mandvekar	+1 8073573666	Student	Confederation college	Good	Alumni	Some industrial base	Designing auto cad should be implemented in the course
7-21-2024 23.21.34	u.ramakishore@gmail.com	Hemanth Uddagiri		Project Lead	ASML Netherlands	Need improvements	Alumni	Stakeholder management, Communication	Leadership, Project Management
7-22-2024 6.44.52	vtu8604@veltechuniv.edu.in	Balasubramaniyan V	9750602517	Senior Engineer	UCAL LIMITED	Good	Alumni	Design and analysis software CAD/CATIA	Strength of materials and its consideration knowledge
7-23-2024 18.41.02	syedfaris0922@gmail.com	SHAIK SYED FARIS	6302328441	CSD Trainee	Cognizant	Good	Alumni	Java programming, Python programming,	Java programming, Python programming, General aptitude, English

Name	Students able to apply engineering knowledge to solve problems	Students able to analyze and provide solutions	Students able to design by considering needs of health & safety, cultural, societal, and environmental considerations	Students able to conduct investigations on selected problem definition	Students able to use latest tools, techniques in projects	Students able to identify and follow ethics, rules and regulations related to project	Students able to understand impact of solutions on environmental and provide sustainable solutions	Students able to follow norms of engineering practice (ex: ASTM, ISO)	Students able to demonstrate leadership and team play	Students able to communicate professionally	Students able to bargain, budgeting and follow principles project management	Students demonstrating life long learning skills (ex: online courses, learning required skills by own)
Ch Sravanth Kumar	Neutral	Neutral	Neutral	Neutral	Strongly Agree	Neutral	Neutral	Strongly Agree	Strongly disagree	Neutral	Strongly Agree	Neutral
Dr. Naveen R	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Neutral	Neutral	Strongly Agree	Strongly Agree	Strongly Agree
Aakash Kiran mandvekar	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Hemanth Uddagiri	Strongly disagree	Strongly disagree	Neutral	Neutral	Strongly disagree	Neutral	Neutral	Neutral	Strongly disagree	Neutral	Strongly disagree	Neutral
Balasubramaniyan V	Neutral	Neutral	Neutral	Strongly Agree	Neutral	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Neutral	Neutral	Strongly Agree
SHAIK SYED FARIS	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Strongly Agree	3	3	3	4	4	4	4	4	5	3	4	4
Neutral	2	2	2	2	1	2	2	2	1	3	1	2
Strongly disagree	1	1	1	0	1	0	0	0	0	0	1	0
Score	72	72	72	89	78	89	89	89	94	83	78	89
Remark	Attained; Need further improvement	Attained; Need further improvement	Attained; Need further improvement	Attained	Attained; Need further improvement	Attained	Attained	Attained	Attained	Attained	Attained; Need further improvement	Attained

Timestamp	Email Address	Name	Mobile Number	Designation	Organization	Curriculum and syllabus of our department is	Are you	What skill set required for students.	What tools required for students.	Any specific topics required to be added to syllabus / as course
7-18-2024 19.34.43	vigneshm1@srmist.edu.in	Dr. M VIGNESH KUMAR	9940785645	Assistant Professor	SRM institute of science and technology	Good	Employer / External project supervisor	Practical application of their theoretical knowledge and prediction	Ansys	Nil
7-22-2024 19.02.13	emailsmvignesh@gmail.com	Vignesh S M	8248486386	Application Engineer	CADFEM	Need improvements	Employer / External project supervisor	Social Media influencers in LinkedIn & Twitter for engineering	Fluent Aero & Ansys STK	Ansys STK for Lab

Name	Students able to apply engineering knowledge to solve problems	Students able to analyze and provide solutions	Students able to design by considering needs of health & safety, cultural, societal, and environmental considerations	Students able to conduct investigations on selected problem definition	Students able to use latest tools, techniques in projects	Students able to identify and follow ethics, rules and regulations related to project	Students able to understand impact of solutions on environmental and provide sustainable solutions	Students able to follow norms of engineering practice (ex: ASTM, ISO)	Students able to demonstrate leadership and team play	Students able to communicate professionally	Students able to bargain, budgeting and follow principles project management	Students demonstrating life long learning skills (ex: online courses, learning required skills by own)
Dr. M VIGNESH KUMAR	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Vignesh S M	Neutral	Neutral	Strongly Agree	Neutral	Neutral	Neutral	Strongly Agree	Neutral	Neutral	Neutral	Strongly disagree	Neutral
Strongly Agree	1	1	2	1	1	1	2	1	1	1	1	1
Neutral	1	1	0	1	1	1	0	1	1	1	0	1
Strongly Disagree	0	0	0	0	0	0	0	0	0	0	1	0
Score	83	83	100	83	83	83	100	83	83	83	50	83
Action	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Not Attained	Attained

Name	Curriculum and syllabus of our department is	Courses you taught at Vel Tech	Time is not adequate in below courses	COs need to be modified in below courses	Please list tools / software requires to join as entry level position	Please list tools / software requires for mid level jobs	List any topics to be added to the syllabus or as course
Boopathy G	Good	Solid Mechanics, Aircraft Structural Mechanics, Aircraft Structural Dynamics, Aircraft Materials	Nil	Nil	Auto CAD	Catia and Ansys	Nil
Dr Vinothkumar M	Good	Space Exploration	Adequate time	Nil	ICT tools	ALN methods	Nil
Rakeshkumar	Good	Thermodynamics,rocket and space propulsion, electric propulsion, cryogenic engineering	Thermodynamics and heat transfer	Nil	Catia,ansys	Ls DYNA,Abaqus	Nil
Dr.S.Ganesan	Need improvements	Themodynamics and Heat Transfer	Thermodynamics and Heat Transfer	Nil	CATIA and Creo	Ansys, Comsol	Nil

Timestamp	Email Address	Name	Mobile Number	Designation	Organization	For	Curriculum and syllabus of our department is	Are you	Please list tools / software requires to join as entry level position at your organization	Please list tools / software requires for your current position at your organization	List any topics to be added to the syllabus or as course
7-17-2024 16.46.53	aeroramasamy@gmail.com	Ramasamy Muthiah	+91 6384314252	Business Head	Aeroline Enterprises	UG	Good	Industry Expert	CATIA	Hypermesh	Nil
7-17-2024 18.02.34	yddwivedi@gmail.com	Dr.Yagya Dutta Dwivedi	8555815261	Professor	Institute of Aeronautical Engineering	UG	Good	Industry Expert	Catia	Ansys, Hypermesh	OpenFoam
7-17-2024 21.48.55	lakshu.me@gmail.com	Lakshmanan.P	9940644972	Project Manager	Ford Motor Pvt Ltd	UG	Good	Industry Expert	Abaqus, LSDYNA, NX CAD, STARCCM	Lsdyna, Abaqus, starccm	All good
7-21-2024 22.51.39	gullapavan102@gmail.com	G pavan	7993277957	Senior aeronautical engineer	NAATS AVIATION PRIVATE LIMITED	UG	Need improvements	Industry Expert	Catia v5,ansys CFD and structures, XFLR5 performance and stability analysis (UAV's OR aircrafts). Matlab using performance calculation, stability analysis and UAV 3D simulation)	Arudopilot software (mapping , flight log analysis,pid tuning, integration of electronics)	1.Composite manufacturing lab (types of manufacturing process experiment). 2. Mini project (manufacturing and testing of fixed wing UAV's using composite parts). 3. UAV and aircraft certification process (DGCA and easa). 3 syllabus to add in aircraft propulsion (propeller design process) 4. Syllabus to add in Rock propulsion (how to develop real time Rock propulsion and step by step process (solid propulsion and liquid propulsion).
7-22-2024 19.05.09	emailsmvignesh@gmail.com	Vignesh S M	8248486386	Application Engineer	CADFEM	PG	Need improvements	Industry Expert	Ansys STK & ANSYS Fluent & Mechanic	Fluent, Rocky, Chimkin Pro, STK	Flight mechanics for Drone using ANSYS STK

Timestamp	Email Address	Name	Mobile Number	Designation	Organization	For	Curriculum and syllabus of our department is	Are you	Please list tools / software requires to join as entry level position at your organization	Please list tools / software requires for your current position at your organization	List any topics to be added to the syllabus or as course
7-17-2024 21.35.25	aerodhinesh@gmail.com	Dr. S. R. Dhineshkumar	9791797072	HoD & Associate professor	Mahaveer Institute of Science and Technology	UG	Good	Academic Expert	NA	NA	It will be highly beneficial to students if subjects related to manufacturing processes and materials were added to the syllabus
7-17-2024 21.45.17	kumar.vinoth.ae@gmail.com	Vinoth Kumar	0767741990	Research Scholar	ETH zurich	UG	Good	Academic Expert	None	None	Already good
7-21-2024 19.06.20	kannan4028@gmail.com	Kannan		Senior CFD engineer	Valeo	UG	Need improvements	Academic Expert	ANSYS,STAR CCM	ANSYS	Computational fluid dynamics, Artificial intelligence
7-22-2024 7.30.26	vinoth418.ant@gmail.com	Dr. T. VINOTH		Postdoctoral Researcher	UNESP-FEG	UG	Good	Academic Expert	PHD	PHD in LCA	Sustainability Management
7-22-2024 12.13.54	premanand.tp@rajalakshmi.edu.in	PREM ANAND T P	9710560079	Assistant Professor	Rajalakshmi Engineering College	PG	Good	Academic Expert	python programming, MATLAB	MATLAB, anaconda for programming	Machine learning for UAV autonomous control, MEMS in UAV

Timestamp	Email Address	Name	Mobile Number	Curriculum and syllabus of our department is	Are you	What courses you feel time is not enough to teach.	What courses you feel content is large	What courses you feel examination is tough
7-17-2024 17.10.34	vtu17908@veltech.edu.in	Srekar. D	9866041605	Good	Student	Linear systems analysis and control	Aerodynamics	Compressible Flow of Aerodynamics
7-17-2024 20.44.12	vtu22745@veltech.edu.in	Kanaparthi Siva Vighnesh	6301172127	Good	Student	Nil	Nil	Nil
7-22-2024 8.51.51	vtu20034@veltech.edu.in	MOLLETI HARI		Good	Student	FM, TD, SM, EM, CFD	CFD, ASM	FM, TD
7-22-2024 13.00.14	awdheshpalvtu@gmail.com	Awdhesh Pal	9142383365	Good	Student	Aerodynamic, Structure Analysis, Aircraft performance	Aircraft Performance	Aircraft Performance
7-23-2024 11.13.16	vtu12589@veltech.edu.in	Tanniru.venkata krishna	6301969002	Need improvements	Student	No	Yes	Moderate

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Srekar. D	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Neutral
Kanaparthi Siva Vighnesh	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Neutral	Neutral	Strongly Agree	Neutral	Neutral
MOLLETI HARI	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Strongly Agree	Strongly Agree	Neutral	Strongly Agree
Awdhesh Pal	Strongly Agree	Neutral	Strongly Agree	Strongly Agree	Strongly Agree	Neutral	Strongly Agree	Strongly Agree	Strongly Agree	Neutral	Strongly Agree	Strongly Agree
Tanniru.venkata krishna	Neutral	Neutral	Strongly Agree	Strongly Agree	Neutral	Neutral	Neutral	Strongly Agree	Neutral	Strongly Agree	Strongly Agree	Neutral

SA	3	2	4	4	3	2	3	3	3	4	3	2
N	2	3	1	1	2	3	2	2	2	1	2	3
SD	0	0	0	0	0	0	0	0	0	0	0	0
Score	87	80	93	93	87	80	87	87	87	93	87	80
Action	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained	Attained

Timestamp	Email Address	Name	Mobile Number	Designation	Organization	Giving suggestion for	Curriculum and syllabus of our department is	Are you	What skill set required for your entry level position at your organization	What skill set required for your present designation	Suggest us any tools and topics to be added as course and topics in syllabus
7-19-2024 10.52.18	vtu22745@veltech.edu.in	Kanaparthi Siva Vighnesh	9121206317	Govt. Job	Veltech	UG	Good	Parent	Nil	Nil	Nil

Name	Students able to apply engineering knowledge to solve problems	Students able to analyze and provide solutions	Students able to design by considering needs of health & safety, cultural, societal, and environmental considerations	Students able to conduct investigations on selected problem definition	Students able to use latest tools, techniques in projects	Students able to identify and follow ethics, rules and regulations related to project	Students able to understand impact of solutions on environmental and provide sustainable solutions	Students able to follow norms of engineering practice (ex: ASTM, ISO)	Students able to demonstrate leadership and team play	Students able to communicate professionally	Students able to bargain, budgeting and follow principles project management	Students demonstrating life long learning skills (ex: online courses, learning required skills by own)
Kanaparthi Siva Vighnesh	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Neutral	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Action	Attained	Attained	Attained	Attained	Attained	Awarness on curriculum to parents	Attained	Attained	Attained	Attained	Attained	Attained

Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology

Department of Aeronautical Engineering

Feedback Anlysis - May 2023

Name	Qualification	Designation & Company	Knowledge for present designation	List the specific tools/techniques using in your industry	List the skill set and tools required for meeting future trends in your domain	Email ID
Kondaka Shiva Sankar	B.Tech Aeronau	Engineer, Hubble Fly	DGCA Rules, Design of UAV	Design and Analysis tools for UAV components	ROS, Flight Dynamics	k.shivasankar729@gmail.com
Daljit	MS [Aeronautic	Aerospace Engineer, Bellwether industries, Taiwan	Deep Engineering Knowledge, First Principle Thinking & Communication .	Flow Visualization and AD	AI & ML for Aero	daljitaero96@gmail.com
BALASUBRAMANIYAN V	B.Tech. Aero	Graduate Engineer, Executive,UCAL TECHNOLOGIES (Aerospace and defence division of UCAL Fuel Systems Ltd)	Design and Manufacturing	Advanced composite materials parts production with Autoclave machine.	Design and Structural analysis of composite materials for aerospace.	v.bala251099@gmail.com
Renukadevi	BE	CAE ENGINEER, FEMLOGIC TECHNOLOGIES	Strength of materials	Hypermesh, Cadd, catia	SIMLAB, FUSION	renuaero@gmail.com

Action Items

Include DGCA rules in syllabus

Include Flow Visulization in theory part

Establish VP - Composite Facility

Include Simulations in Structures

DC 1	DC 2	DC 3	DC 4	HoD
(Propulsion)	(STRUCTURES)	(AERODYNAMICS) 29/05/23	[FMC] 29/5/23	Dr. R. Ja...raj, Head of the Department, Aeronautical Engineering, Vel Tech

Domain	Aerodynamics		Domain Coordinator	Mr. A. Adaikalaraj	
Proposed	Designed by	Vel Tech	University A(MIT)	University B(Georgia Tech)	University C(Imperial College)
Fluid Mechanics	Mr. S. Kannan	Fluid Mechanics	Fluid Mechanics	Fluid Mechanics	Aerodynamics I
Incompressible flow Aerodynamics	Mr. A. Adaikalaraj	Incompressible Flow Aerodynamics	Aerodynamics	Advanced Aerodynamics	AD
compressible flow Aerodynamics	Mr S.Suthagar	CFA	Compressible Flow	Elements of Compressible Flow, Advanced Aerodynamics	Aerodynamics 2
CFD	Dr.R.Naren Shankar	CFD	CFD	CFD	
			https://ocw.mit.edu/courses/aeronautics-and-astronautics/	https://ae.gatech.edu/ae-graduate-courses##AFM	https://www.imperial.ac.uk/aeronautics/study/ug/current-students/modules/h401/

Skills & Tools from Feedback						
Proposed	**Skill 1**	**Skill 2**	**Skill 3**	**Tool 1**	**Tool 2**	**Tool 3**
FM	Ability to do design aerodynamic components	Practical and/or problem-solving skills		Python	Creo, Solidworks	Fish bone, pareto
ADI	Engineering Drawings					
ADII	Critical thinking on compressible flow			Multi-physics	Scrum	Ansys, Patran, Nastran, Hypermesh, Abaqus, Creo, Catia
CFD	Programming	Project Planning	Analyze Fluid Flow and Heat Transfer	Agile Methods	Automation	

List of Experts Feedback Received						
S No	**Name**	**Qualification**	**Designation**	**Company**	**Domain**	**Email ID**
1	R Dhisondhar	M.Tech	R&D Verification Engineer	Ansys software private limited, Pune	AD	r.dhisondhar@gmail.com
2	K Deepak	M.E	IT Analyst,	TCS, Kochi	AD	deepakkg88@gmail.com
3	V BALASUBRAMANIYAN	B.Tech	Graduate Engineer, Executive,	UCAL TECHNOLOGIES (Aerospace and defence division of UCAL Fuel Systems Ltd)	AD	v.bala251099@gmail.com
4	Abdul Rauf	M.E	Tech lead	Vestas Wind Systems, Chennai	AD	abdulraufaero@gmail.com
5	PL RajaRao	M.Tech,	Team Leader	Vestas Wind Systems, Chennai	AD	rajarao.pl@gmail.com
6	Mariappan lakshmanan	B.Tech	Tech lead	L&T technology services	AD	gauthamari@gmail.com
7	Ravi	DME	QC	MOTHERSON	AD	ravi.dmec@gmail.com
8	Dinesh	B.E Aero	Senior Engineer	FCA India Pvt Ltd	AD	jagannathandinesh@gmail.com
9	Mukundhan Selvam	Masters of Science (Aerospace engineering)	Computational scientist	MSC Software Corporation	AD	mukunthhgr8@gmail.com
10	Akbaf Gaffoor	B.E Aero	Manufacturing	Arrival Automotive	AD	akbar.aero@gmail.com
11	Selvaganapathy Nagarajan	B.E Aero	Manufacturing	VMC machine technician	AD	ganapathy013@gmail.com
12	PURUSHOTHAMAN SEETHARAMAN	M.Tech (ECE)	Senior Scientist,	ISRO, Bangalore	AD	purushoth11atms@gmail.com

Course Name	Vel Tech	University A(MIT)	University C(Imperial College)	University B(Georgia Tech)
	Basic concepts of fluid, & Properties of fluids	Introductory Concepts and Properties of fluids		
	Fluid statics - relationship between the static pressure, absolute and gauge pressures			Pressure distribution in a fluid
	Measurements of pressure by various manometers	Measurements of pressure by manometers and pressure gauges	Measurements of pressure by manometers and pressure gauges	Measurements of pressure by manometers and pressure gauges
				Forces on plane and Buoyancy concepts
	Measurements of pressure by various types of pressure gauges	Hydrostatic Equation, Manometer and types	Measurement Techniques: Measurement of static and total pressure.	Fluid statics and Manometry
	Kinematics - Flow visualization concepts and types of lines			flow lines and their various types
	Velocity field and acceleration			Various velacitity and acceleration fields in fluid flow
	Classification of flows			
	continuity equation in one and three dimensional differential forms			Derivation of continuity equations in three dimensional forms
	Equation of stream function and velocity potential function	Equation of streamline, stream function and velocity potential function,	streamlines and stream functions.	Equation of stream function
	Euler's equations of motion along a streamline for a steady flow		Euler's equations of motion along a streamline for a steady flow	
			Concept of Rotation of a Fluid Element such as Vorticity, irrotational flow and Laplace's equation.	
	Bernoulli's equation for real fluid and their applications	Bernoulli's equation	Bernoulli's equation for real fluids	
	Introduction and Needs for dimensional analysis	Dimensional Analysis	Dimensionless analysis concept	Dimensional analysis concepts
Fluid Mechanic	Methods of dimensional analysis			
	Dimensionless parameters and their applications		Buckingham's rule in methods of dimensional analysis	Buckingham Pi theorem in dimensional analysis
	Concept of Similitude and various types of similarities	Dynamic Similarity and types	similarity parameters - Mach number and Reynolds number.	concept of similitude and their laws
	Model Analysis, model laws and classications			Methods of Modeling analysis
	Boundary conditions for real fluids			Fluid flow through in pipe lines
	Boundary layer thickness and Reynolds number and related properties			Fully developed flow
	Flow of viscous fluid through circular pipe (Hagen-Poiseuille Flow)		laminar and turbulence flow in a circular cross-section pipe.	Laminar and turbulent flow
	Coefficient of Friction			
	Expression for loss of head due to friction in pipes or Darcy – Weisbach Equation.			Colebrook formula. Minor losses
	Concept of hydraulic gradient and total energy lines			
	Moody's Diagram-Turbulent flow through pipes			
	Boundary layer concept in the study of fluid flow		boundary layer development, effect of pressure gradient	Laminar and turbulent boundary layers.
	Drag force on a flat plate due to boundary Layer			Drag force on a flat plate due to boundary Layer
	Separation of boundary layer		separation of boundary layer	Flow transition and Separation of boundary layer
	Drag and Lift on immersed bodies and Numerical problems.			
		Control Volumes, Mass Conservation & Control Volume Applications		
		Substantial Derivative		
	UNIT-I INTRODUCTION TO LOW SPEED FLOW			**I- Introduction and Review of Basic Aerodynamic Topics**
	Modeling the fluid with different types of approach for kinetics and kinematics s	Apply flow similarity, non-dimensional coefficients such as the lift and drag coefficient, and non-dimensional parameters such as the Mach number and Reynolds number in aerodynamic modeling of realistic configurations (homework, team project reports, exams).	Review of control volume approach for aerodynamics	Incompressible Aerodynamics
	Governing equations in fluid dynamics	Integral form of conservative governing equations	Fundamental concept of vorticity and circulation	Slender Wing Body
	Concept of Stream function and potential function in fluid dynamics and applica	Estimation of Drag force from basic sources	Force exerted on a converging nozzle total pressure loss on a duct with r	Subsonic Transformations
	Derivation of Euler equation and incompressible Bernoulli's equation from the N	Explain the motion and deformation of a fluid element using kinematics including the definition of shear strain, normal strain, vorticity, divergence, and the substantial derivative (homework, exams).	Derivation of Bernoulli's equation	Transonic Flow
	UNIT-II TWO DIMENSIONAL INVISCID INCOMPRESSIBLE FLOW		Basic flows and their combinations	Supersonic Airfoils
	Two dimensional Laplace equation for fluid dynamics	The concept of a laminar boundary layer	Joukowski lift theorem	Laminar, Turbulent And Transition
	Deriving the velocity, stream function and potential function expressions for bas	Boundary layer separation and estimation of the local thickness and skin friction	Flow past a circular cylinder with and without lift	**II. Integrated Aerodynamics**
	Concept of Ideal Flow over a circular cylinder	Estimation friction drag over a flat plate	D'Alemberts paradox	Wing, Body and Fuselage Interactions
	Idea of D'Alembert's paradox and Magnus effect in low speed Aerodynamics	Elements of 2-D panel methods and 3-D vortex lattice methods	Theory of Complex Potential	Interference Drag
	The Kutta-Joukowski Theorem and the Generation of Lift for an Inviscid and Inc	Basic elements of coupled inviscid-viscous models for 2-D airfoils	Conformal mapping of circle to ellipse and flat plate	Missile/Fin and Slender Body Aerodynamics
	Actual flow over smooth and rough cylinder from Application perspective	Basic elements of thin airfoil potential flow models for 2-D subsonic and supersonic flows	Deriving the relation between complex velocities in circle plane and transformed	Design Approaches

Incompressible flow Aerodynamics		Apply thin airfoil potential flow models to estimate the forces on airfoils in 2-D subsonic and supersonic flows	Effect of flow past ellipse at zero incidence and flow past ellipse at incidence	**III. Introduction to Unsteady Aerodynamics**
		Basic elements of the lifting line model for high aspect ratio wings	control of circulation and lift by specifying rear stagnation point	Piston Theory
		Describe the dependence of lift and induced drag on geometry and performance parameters using the lifting line model	Lift of a flat plate and pressure distribution on the flat plate from Kutta cor	Vortex Flows
	UNIT-III AIRFOIL THEORY	Explain the basic elements of the finite volume approximation to the compressible Euler and Navier-Stokes equations	Effect of camber and thickness.	Separated Flows
		Apply the lifting line model to estimate lift, induced drag, and roll moments on high	Skin friction, two-dimensional laminar boundary layer, boundary layer dev	Bluff Bodies
	Basics of Transformation from one coordinate to other coordinate system	Explain the use of wind tunnel testing in aerodynamic modeling focusing on the	Laminar flow in a two-dimensional duct, laminar flow in a circular cross se	Rotating Configurations
	Methodology of conformal transformation and KJ transformation and in incomp	Assess the ability and limitations of an aerodynamic model to estimate lift and	Turbulent Flow: Introduction to transition, turbulence, turbulent pipe flow.	
	Kelvin's circulation theorem and starting vortex	Contribute substantially as an individual to the design and execution of a	Introduction to flow around wings and trailing vortices.	
	Classical thin airfoil theory for symmetrical and cambered airfoil			
	UNIT-IV WING THEORY			
	Introduction to Incompressible Flow over Finite Wings			
	Idea about The Vortex Filament, the Biot-Savart Law and Helmholtz's Theorems			
	Concept of bound vortex and trailing vortex and horse shoe vortex			
	Prandtl's Classical Lifting-Line theory			
	UNIT-V VISCOUS FLOW			
	Boundary layer concept in the study of fluid flow			
	Separation of boundary layer and conditions			
	Study on flow over a flat plate			
	Derivation of Blassius solution			
	Definition Of Compressible Flow,Basic Equation of compressible flow, Classifications of compressible flow	Define the similarity principles that apply to compressible flows	Demonstrate understanding of wave propagation phenomena and the flow properties in compressible subsonic and supersonic flow	
	Integral Forms of the Conservation Equation for inviscid flow	Define quantitatively the regimes of applicability of quasi-one-dimensional channel flow theory	Continuity, momentum and energy equations;	Continuity Equation, Momentum Equations, Energy Equation, Ent
	Mach number and Mach angle,Characteristic Mach number	Quasi-one-dimensional channel flow	Mach waves and Mach cones Characteristic equations and compatibility conditions.	
	Streamtube Area-velocity relation,	Use the Method of Characteristics to design optimum inlets, nozzles		
	De Laval Nozzle- Flow in a convergent divergent nozzle	Method of Characteristics to analyze a variety of internal and external flows: airfoils, inlets, nozzles, and jet flows;	convergent-divergent nozzles	
	Normal shock relations-Prandtl's relation	Explain the starting behavior of supersonic diffusers and inlets;	Derive the governing equations of 1D compressible flow, extend them to obtain the equations for normal shocks and varying area ducts, and apply them to solve problems of stationary and moving normal shock waves, quasi-1D flow in ducts and supersonic wind tunnels	Normal Shocks
	Hugoniot equation			
	Rayleigh Supersonic Pitot tube equation	Describe the assumptions and physical meaning of terms in the equations of motion for continuum flow;		
	One Dimensional flow with Heat addition and Friction	Define the conditions for, and effect on flow state of the different types of discontinuities that occur in a compressible flow	Rayleigh flow, Fanno flow	
	Interaction of oblique shock waves,Oblique shock relations,M relation	Define quantitatively what it means for a flow to be considered "compressible";	The oblique shock wave	Oblique Shocks (Flow over Concave Walls)
	Shock Polar	Define quantitatively effects of swirl and flow non-uniformity on maximum flow per unit area in a channel;		
	Shock-boundary layer interaction		attached and detached shock waves	
	Transonic lambda shock			
compressible flow Aerodynamics	Intersection of shocks of the same family,opposite families		shock wave reflection	
	Prandtl-Meyer expansion Waves	Describe expressions for and explain the link between vorticity generation and gradients in shock strength;	Prandtl-Meyer expansion waves	Prandtl Meyer Expansion (Flow over Convex Walls)
	Shock Expansion theory		Shock expansion theory	

Linearisation of the Potential Equation		Explain the relationships for 2D compressive and expansive wave systems and apply to solve problems using both exact and linearised approaches	Linearized small-disturbance theory, application to simple flows
Linearized Pressure Coefficient			
Linearized Subsonic Flow -Prandtl-Glauert rule			
Linearized two dimensional supersonic flow theory			
Method of Characteristics,2 Dimensional supersonic nozzle design			
Critical Mach number-Drag divergence Mach number			
Shock Stall			
Supercritical Airfoil Sections			
Transonic area rule			
Swept wing	Characterize quantitatively the links between flow angle and pressure changes in a supersonic flow and the differences with subsonic flows	Differentiate the properties of high speed transonic and supersonic wing sections and describe the factors affecting the design of supercritical and supersonic aerofoils	
Airfoils for supersonic flows-Lift, drag, pitching moment and Centre of pressure for supersonic profiles	Calculate the lift and drag over simple aerodynamic shapes in compressible, inviscid flowsForces, moments, and loss generation resulting from compressible fluid flow interactions with aerodynamic shapes in subsonic, supersonic, transonic, and hypersonic flight,		
Design considerations for supersonic aircraft- aerodynamic heating	Disturbance behavior in unsteady compressible flow.		
	Forces, moments, and loss generation resulting from compressible fluid flow		
Vel Tech	**University A(MIT)**	**University C(Imperial College)**	
UNIT I GOVERNING EQUATIONS AND BOUNDARY CONDITIONS			
Basics of computational fluid dynamics		**Introduction**	
Governing equations of fluid dynamics: Continuity, Momentum and Ene	Conservation Laws in Integral and Differential Form, The Forward Euler Method, Conservation Law Form,	Governing equations: conservative/integral form. Systems of Conservation Laws	
Chemical species transport			
Physical boundary conditions			
Time-averaged equations for Turbulent Flow			
Turbulent–Kinetic Energy Equations			
Mathematical behaviour of PDEs on CFD- Elliptic, Parabolic and Hyperbolic equations.	Numerical Methods for PDEs, PDE	Classification of Model Equations: (Elliptic, parabolic and hyperbolic), Examples of 1-D hyperbolic conservation laws.	
UNIT II FINITE DIFFERENCE AND FINITE VOLUME METHODS FOR DIFFUSION			
Derivation of finite difference equations	Finite Difference Method, Order of Accuracy, Errors, Local Truncation Error, Local Order of Accuracy, Backwards Differentiation Methods	Finite Differences (FD),	
Simple Methods	Backwards Differentiation Excercise	Analysis and Solution of Finite Difference Schemes:Order	
General Methods for first and second order accuracy	Finite Difference Approximations, Finite Difference Methods, Finite Difference Method Applied to 1-D Convection,	truncation error, consistency of a scheme	
Finite volume formulation for steady state	Types of Errors, Convergence of Numerical Methods, Rate of Convergence, Local Truncation Error		
One, Two and Three –dimensional diffusion problems			
Parabolic equations – Explicit and Implicit schemes	Implicit Methods	Explicit and implicit time integration.	
Example problems on elliptic and parabolic equations			
Use of Finite Difference			
Use of Finite Volume methods.			
UNIT III FINITE VOLUME METHOD FOR CONVECTION DIFFUSION		(linear advection-diffusion equations).	
Steady one-dimensional convection and diffusion	Convection, Diffusion, Convection-Diffusion	Finite Volume (FV)	
Central differencing schemes			
upwind differencing schemes		Upwind schemes: flux vector and flux difference splitting.	

properties of discretization schemes		Construction of Basic Numerical Schemes:
Conservativeness,		
Boundedness,		
Transportiveness,		
Hybrid,		
Power-law,		
QUICK Schemes.		
UNIT IV FLOW FIELD ANALYSIS		
Finite volume methods	Zero Stability and the Dahlquist Equivalence Theorem	Construction of model 1-D problems,
Representation of the pressure gradient term	errors, error estimations	
continuity equation		
Staggered grid	gradient based optimization	
Momentum equations		
Pressure and Velocity corrections		
Pressure Correction equation,		
SIMPLE algorithm and its variants		
PISO Algorithms.		
UNIT V TURBULENCE MODELS AND MESH GENERATION		
Turbulence models,		
mixing length model,		
Two equation (k-Є) models		
High and low Reynolds number models		
Structured Grid generation		
Unstructured Grid generation		
Mesh refinement		
Adaptive mesh		Computational domain and boundary conditions.
Software tools.		Reduced models and range of applicability and limitations.
Introduction to CFD		
UNIT I FUNDAMENTAL CONCEPTS		
Introduction - Basic Equations of Fluid Dynamics		
Incompressible In viscid Flows: Source, vortex and doublet panel, methods		
lifting flows over arbitrary bodies.		
Mathematical properties of Fluid Dynamics Equations -_ Elliptic, Parabolic and Hyperbolic equations		
Well posed problems		
discretization of partial Differential Equations.		
Explicit finite difference methods of subsonic, supersonic and viscous flows.		
UNIT II GRID GENERATION		
Structured grids.		
Types and transformations.		
Generation of structured grids.		
Unstructured grids.		
Delany triangulation.		
UNIT III DISCRETIZATION	Discretization	Discretization of viscous terms.
Boundary layer Equations and methods of solution		
Implicit time dependent methods for inviscid and viscous compressible flows		
Concept of numerical dissipation		
Stability properties of explicit and implicit methods	Consistency, Stability, Stability region	Courant-Friedrichs-Lewy condition and diffusive time step restrictions.
Conservative upwind discretization for Hyperbolic systems		
Further advantages of upwind differencing.		
		Finite Elements (FE).
UNIT IV FINITE ELEMENT TECHNIQUES		
Overview of Finite Element Techniques in Computational Fluid Dynamics.		
Strong and Weak Formulations of a Boundary Value Problem.		

	UNIT V FINITE VOLUME TECHNIQUES			
	Finite Volume Techniques	Finite Volume Method in 1-D,Finite Volume Method Applied to 1-D Convection, Finite Volume Method in 2-D, Finite Volume Method for 2-D Convection on a Rectangular Mesh, Finite Volume Method for Nonlinear Systems, Upwinding and the CFL Condition		
	Cell Centered Formulation			
	Lax - Vendoroff Time Stepping			
	Runge - Kutta Time Stepping	Runge-Kutta Methods, Two-Stage Runge-Kutta Methods, Four-Stage Runge-Kutta Method		
	Multi - stage Time Stepping	Multi-Step Methods	Numerical Schemes for Multi-Dimensional Problems:	
	Accuracy			
	Cell Vertex Formulation			
	Multistage Time Stepping			
	FDM -like Finite Volume Techniques – Central and Up-wind Type Discretizations			
	Treatment of Derivatives.			
	Flux – splitting schemes.			
	Pressure correction solvers – SIMPLE, PESO.			
	Vorticity transport formulation.			
	Implicit/semi-implicit schemes.			
CFD				

	Programme Outcome	FM	LSA	HSA	CFD
Domain Specific Knowledge and Reasoning	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems Apply _____ mathematics to solve _______ complex engineering problem Apply _____ science concepts to solve ________ complex engineering problem Apply ______ engineering to solve ______ complex engineering problem Apply ______ Aerodynamics / Propulsion / Structure / FMC concept to solve ____ (Specialization topic) problem	Apply the governing equations of fluid mechanics to identify the velocity & potential functions	Apply governing equations of fluid flow and identify responses of airfoil & wing with given flow conditions	Apply governing equations of fluid flow and estimate flow characteristics across nozzles & inlets	Apply numerical method concepts to generate suitable grids for given configuration & flow field
	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. Identify _____ (Domain) concepts using _______ technique / method Formulate ______ (Domain) concepts using _______ technique / method Collect solution methods in ____ (Domain) concepts using _______ technique / method to select suitable technique to solve ______ complex engineering problem Analyze the ____ (domain) problem to identify ____ solution	Compute boundary layer thickness & aerodynamic forces for flat plates using analytical method	Formulate appropriate aerodynamic models to predict the forces and moments on aircraft configurations.	Identify different shock patterns for a given flow conditions and compute change in properties of fluid	Solve different mathematical models of fluid dynamics using Finite Difference, Finite Volume and diffusion techniques
	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. Identify public health & safety / cultural / societal and environmental needs for designing ________ (Domain) system / machine / technique / methodology / vehicle Design solutions for solving _____ (topic and domain) complex problems and argue its effects on _______ (public health & safety / cultural / societal and environmental)			Design solutions for supersonic flow regim flights and compute suitable shape for given flight conditions	

	Programme Outcome	FM	LSA	HSA	CFD
Professional and personal Skills	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. Design the_______ experiment / problem / methodology to learn / solve / practice ______ (domain & problem / topic / technique) Analyze the data from ______ experiment / problem / methodology to learn / solve / practice ______ (domain & problem / topic / technique) Interpret the _______ (domain & problem / topic / technique) solutions to synthesis the _______ (topic/problem/experiment & domain) problem solving methodology	.	Analyze various types of flow & its effects on different configurations		Analyze different flow fields & develop simple algorithms to solve flow over given configuration
	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. Develop _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Identify _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Apply _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Identify (limitations / saturated phenomena) of _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to estimate _______	Perform dimensional analysis of fluid models			Identify suitable software for a given flow field and configuration
	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. Investigate _______ (Solution/technique/practice) of______ (domain & problem) to interpret ______ (societal, health, safety, legal and cultural issues) problems. Explain professional practices on ______ (domain & problem)				

	Programme Outcome	FM	LSA	HSA	CFD
	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. Design _____ (solution/technique/methodology & domain) to fulfill _______ (societal and environmental) norms of local governance Practice / identify / formulate / design sustainable development product on _________ (Domain & problem / vehicle / product / system)				
	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. Explain DGCA rules for ____________ (practice / design / problem / product / vehicle & domain) Explain FAA rules for ____________ (practice / design / problem / product / vehicle & domain) Explain ICAO rules for ____________ (practice / design / problem / product / vehicle & domain) List professional practices in DGCA / FAA / ICAO for _______ (domain)				
Skills & Lifelong Learning	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings Practice presentation / report writing / data gathering skills on ________ (Domain & Problem) Practice team work by _________ (Domain & Problem)				
	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. Conduct product survey on ____________ (Domain & Problem) Conduct customer survey on _________ (Domain & Problem) Document _______ on _________ (Domain & Problem) as per _____ standard Explain ______ (Domain & Problem) by oral presentation Prepare project report / IV report / Training report / case study on ______ (Domain & Problem)				

	Programme Outcome	FM	LSA	HSA	CFD
Interpersonal S	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. Prepare a team to solve _______ (Domain & Problem) Investigate ______ (Domain & Problem) to identify suitable ____ Develop time chart and budget to carryout ______ (Domain & Problem) Conduct meetings to record _____ (Domain & Problem) status				
	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 Select suitable resource / course / literature for ____ (Domain & Problem)				Select suitable scientific scripts to perform hypersoinic flow analysis
space System Design & CDIO attributes	**Programme Specific Outcomes** **Practice design thinking and realize engineering solutions and its impact on business and societal** **Identify problem in ________________** **Collect __________product information with respect to business / technical point of view** **Compare ___________ products to identify ______________** **List environmental aspects on _____________ problem**		Compare flow field over different configurations		Identify various drag reduction techniques
	Conceive aerospace and related engineering systems and practice designing of complex systems by understanding requirements, system modeling and business. Apply _____________ to identify ______________ (problem definition short) Analyze solutions methods for _________________ (problem) Select ____________ solution method for ________ (problem) List requirements for ________________ (problem) Design ________ (System / simulation /process/product) with _______ (constrains) Develop ________ (System / simulation /process/product) with _______ (constrains) Interpret the ________ (developed / designed solution) for _______ (problem)	Measure parameters in pipe flow problems	Apply experimental technqiues to identify pressure distribution over different configurations		Select suitable drag reduction technique and modify the given aircraft geometry

	Programme Outcome	FM	LSA	HSA	CFD
Aero	Implement best solutions by practicing hardware and software integration, sensing, and simulations; Operate complex engineering systems and understand mission requirements and operation environment. Integrate ___________ system with _______________ Integrate and test the performance of _____________ Test the simulation results of __________________ and identify ___________ Conduct functional test and estimate ________ parameters of ________ (designed / developed) Identify mission requirements of ________ (activity / task) of the ______ (problem) Troubleshoot the given problem / process / product / simulation and analyze the mission _____		Design wing for the given flow conditions		Test the simulation results of given flow conditions and estimate reduction in drag

Domain	Flight Mechanics & Control and Aircraft Design & ROS		Domain Coordinator	Dr.G. Surendar	
Proposed Courses	**Designed by**	**Vel Tech**	**MIT, USA**	**Stanford**	**Purdue Univ**
Engineering Mechanics	Mr.KUMARAN T	Engineering Mechanics	Structural Mechanics		Aeromechanics 1&2
Flight Vehicle Design Lab 1	ALL				
Linear system Analysis & Control	Mr. G.Gowtham	Linear system Analysis & Control			
Flight Vehicle Design Lab 2	ALL				
Aircraft Systems	Mr. Elumalai K	Aircraft Systems & Instruments	Aircraft Systems Engineering	Dynamics and Control of Aircraft	Advanced Aircraft Systems, Aircraft Operating Systems, Aircraft Propulsion Systems, Aircraft Systems For F
Avionics	Mr. Elumalai K	Avionics	Modern Navigation	Navigation Systems	AEROSPACE NAVIGATION AND GUIDANCE, Air Traffic Control and Management, Aircraft Operating Systems
Flight Mechanics	Mr.KUMARAN T	Airplane Performance	Unified Engineering		Flight Testing
Flight Dynamics & Control	Mr. G.Gowtham	Airplane Stability & Control			
Embedded Systems for Aeronautical Engineers	Dr. R. Jaganraj	N/A	Introduction to Computer Science Programming in P	Principles of Robot Autonomy	Signal Analysis for Aerospace Engineering
Aircraft Design	Dr. G. Surendar	Minor Project - I			
		Minor Project - II			
Introduction to Aerospace Engineering	Dr. G. Surendar	Introduction to Aerospace Engineering			
Aeromodelling	Dr. R. Jaganraj	N/A	Link for syllabus from Uni A	Link for syllabus from Uni B	Link for syllabus from Uni C
				https://stanfordasl.github.io/aa274a_aut2021/	https://engineering.purdue.edu/AAE/academics/course-descriptions/AAE301.html
				https://github.com/PrinciplesofRobotAutonomy	

Proposed	Skill 1	Skill 2	Skill 3	Skill 4	Skill 5	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5
EM										
LSA	UAV ,	Design ,	Maths ,							
AD		Civil Aviation Requirements,	Aircraft Type Training							
Avionics			Communication , Avionics ,							
AP		Innovative Thinking ,								
ASC		Autopilot,	Control System,	Artificial Intelligence ,						
IAE	Aviation knowledge,					, CAE	CAD			
Robotics & ROS	Drones,	UAS Piloting.			Machine Learning	Embedded Progr	Basic Programm	, Mission Planner	, DJI Tools	
Avionics	Avionics protocol	python programming	Communication P	DO160 DO178c	control systems	Matlab	C++	python	DOORS JAMMA PREP JIRA SVN	Testing related tools,alm, selenium

List of Experts Feedback Received

S No	Name	Designation	Company	Domain	Email ID
1	Kilimanraj Vijayakumar	Avionics system engineer I	Honeywell	FMC	kilimanraj@gmail.com
2	Gokul Balasubiramani	Software Engineer	Honeywell	FMC	gykgokul@gmail.com
3	Prashanth N	Aerospace Software Engineer	TechMahindra	FMC	prashanthnaga24@gmail.com
4	VARUN PAL J	System Design Engineer	TCS Bangalore	FMC	varunthangaraj95@gmail.com
5	Loga venkatesh	Design and Development Engineer	Comavia system	FMC	loguaerostar@gmail.com
6	Ajay Kumar	Design Engineer	Tonglit autogistic	FMC	ajaykumarreddy323@gmail.com
7	Bhaskar Verma	Repair Engineer (MRO)	Quest Global, UK	FMC	bhaskarverma92@gmail.com
8	ARJUN SD	Lead engineer	Collins Aerospac	FMC	arjunsekarsd@gmail.com
9	Dharchini Bharathi	Avionics Engineer	Collins Aerospac	FMC	space07sat@gmail.com
	Sivashankar	CTO		FMC	
	Samrat Pradhan	Airworthiness Officer, Civil Aviation A	Civil Aviation Aut	FMC	
	SASITHARAN A	Drone Operation Manager	Asteria	FMC	

Course Name	Vel Tech	My Ref	MIT, USA	Stanford	Purdue Univ	Delft University of Technology
Engineering Mechanics	Units and Dimensions		Dimensions and units		Units and Dimensions	Forces and Equilibrium of a Particle
	Vectors		Vectors	Vectors	Vectors	Vectors
	Equilibrium of a particle		Equilibrium of a particle		Particle Dynamics	Forces and Equilibrium of a Particle
	Free body diagram		Free body diagram		Statics of Bodies	free body diagrams
	Moments and Couples		Moments		Force systems	reaction forces and moments
	First moment of area and the Centroid		Beam centroid		Centroids of Plane Areas	bending moment
	Parallel axis theorem and perpendicular axis theorem		Parallel axis theorem		Parallel‑Axis Theorem for Moments of Inertia,Principal Axes and Principal Moments of Inertia	parallel axis theorem
	Moment of inertia		Moment of area, moment of inertia		Moments of Inertia of Plane Areas	moment of inertia, mass moment of inertia
	Work-Energy Equation of particles		Work-Energy Principle		Work and Energy	Work and energy
	Displacement, Velocity and Acceleration, their relationship		Types of boundary conditions		Kinematics of Reference Frames	rigid body for forces or accelerations
	Curvilinear motion		Kinematics of curvilinear motion		curvilinear motion	
	Impulse and Momentum		Momentum and Impulse		Momentum	Impulse and momentum
	Impact of elastic bodies.		solution approaches in elasticity.			
	Friction		Kinetic and Static Friction		Static Friction	
Airplane Performance	International Standard atmosphere		Atmospheric Pressure	Atmospheric Pressure	Atmospheric Pressure	
	Propeller theory		PROPELLERS		Propeller	
	Effect of power plant on aircraft performance		Aircraft performance		Airplane Performance: Accelerated Flight	
	Thrust augmentation.				Thrust augmentation.	
	Drag Polar		Vehicle Drag		The Fundamental Parameters: Drag Polar	
	Steady level flight		Power Required for steady level flight		steady flight	
	Range and Endurance		Aircraft Range: the Breguet Range Equation		Range and Endurance	
	Gliding And Climbing Flight		Climbing Flight		Climb, Descent, and Turn Performance	
	Acceleratd Flight		Climbing Flight		Cruise Performance,Take-off and Landing	
	V-N diagram		v-n Diagram		V-n Diagram	
AIRCRAFT SYSTEMS AND INSTRUMENTS	System - Types of system: Open loop system, Closed loop system		Basic systems engineering		Basic aircraft systems.	closed and open loop systems
	Mechanical System, Hydro-mechanical system, Electrical and Electronics system		Auxiliary Power Unit and Hydraulic Systems, Electrical, Hydraulic, Pneumatic		Includes electrical, fuel, hydraulic, pneumatic.	Mechanical System
	Aircraft primary systems and secondary systems		Use of Subsystems as a Function of Flight Phase	subsystem technologies	Aircraft components and operation	
	Aircraft Seeking System		Aircraft attributes and subsystems			
	Communication System		Aerospace communication systems, aircraft communications, sate	communications	Aircraft communication and navigation equipment.	Communication
	Navigation and guidance system		Guidance, Navigation and Control	Navigation systems, missile guidance	Navigation systems found on modern aircraft	
	Flight control system		Flight Controls		Flight control	
	Propulsion system		Propulsion - Space Shuttle Main Engines		Systems covered include fuel, aircraft propulsion systems	
	Oxygen system		Environmental Control Systems		Environmental (air-conditioning, pressurization, and oxygen)	
	Air conditioning and pressurization system		Environmental Control Systems		Environmental (air-conditioning, pressurization, and oxygen)	
	Oil and lubrication system				Environmental (air-conditioning, pressurization, and oxygen)	
	Fire protection system		Safety and reliability		Fire Production	
	Environmental protection system: Anti icing, De-icing system, rain removal system		Environmental Control Systems		ice-control, warning, and auxiliary power	
	Aircraft sensors - Types of sensors: Air data sensor, accelerometer, gyroscopes, temperature sensors		Navigation Sensors and Systems		Navigation sensors	
	Flight instruments		instrument flight rules		Instrumentation systems	
	Navigation instruments		Guidance, Navigation and Control	Navigation systems	Instrumentation systems	
	Engine instuments		instrument flight rules		Instrument	
			Both design and operations of the space shuttle.		Practical projects utilize small ad transport-category aircraft	
			Risk analysis and management		Emphasis is on installation and maintenance of avionics systems	
	Exp 1: Aircraft Jacking and Levelling					
	Exp 2: Aircraft Rigging Checks					
	Exp 3: Servicing of landing gear hydraulic system					
	Exp 4: Servicing of aircraft fuel system					
	Exp 5: Study of aircraft braking system					
Avionics	Importance of avionics in aircraft and spacecrafts			The dynamic behavior of aircraft and spacecraft	Aircraft and Spacecraft Components	. Introduction to avionics system
	Characteristics of avionics systems		Avionics Systems		Avionics Systems	
	Avionics system design		System Design		Avionics Systems	
	Hardware & Software standards and certifications		Avionics Hardware Design, Commercial Aircraft System Verificat	verification	Airframe and Powerplant Certificate required, certification	Validation and Verification
	Packaging and EMI / EMC		Electromagnetic waves	package delivery	packaging and Electromagnetic Interference and Electromagnetic Wave Propagation	
	Avionics system architecture		system architecture		system architecture	
	Data Buses - Types of data buses: ARINC 429, ARINC 629, CSDB, ASCB, and MIL STD				MIL-STD	
	Digital computers and memories		digital computers, multiprocessors		Digital computers	
	Display technologies: CRT, LED, LCD, EL, and plasma panel		Liquid crystal display (LCD) technology, Light emitting diodes (LEDs)		Display elements	
	Display devices: HUD, HMD, MFD		Evolution of Cockpit Displays		Display elements	
	Cockpit controls: DVI, touch screen, MFK, HOTAS		Evolution of Cockpit Displays		cockpit instruments and controls	
	Typical avionics sub systems		Aircraft attributes and subsystems		supporting subsystems	
	Flight management system		Airline Revenue Management Systems		Flight management	
	Logitudinal and Lateral autopilot system		Aircraft Lateral Autopilots, Aircraft Longitudinal Autopilots	longitudinal and lateral dynamics, autopilot design to enhance st	Autopilots, flight test demonstration of fully autonomous aircraft.	
	Distance measuring equipment		Distance Measuring Equipment		Distance measuring equipment	
	Instrument landing system		Landing and Mechanical Systems		Instrumentation systems	Landing guidance systems
	Microwaves and Radars		Radar Terminal Systems	Radio navigation systems	Microwave and pulse navigation systems	
	Electronic warfare		Electronic Warfare Fundamentals		MILITARY INTELLIGENCE uses Electronic warfare systems.	
	Applications of augmented reality in aviation		Augmented Reality		virtual and augmented reality (AR) tools	
	Digital twins in avionic process		concept of digital twin		Digital Twin Implementation Model	
					Installation practices, and troubleshooting concepts	

Course Name	Vel Tech	My Ref	MIT, USA	Stanford	Purdue Univ	Delft University of Technology
	Exp 1: Programming in digital electronics training kit					
	Exp 2: Programming in microprocessor and micro controller					
	Exp 3: Simple programs using Arduino microcontroller					
	Exp 4: MIL-Std – 1553 Data Buses Configuration with Message transfer					
	Exp 5: MIL-Std – 1553 Remote Terminal Configuration					
	Exp 6: Calibrate the Load cell for propeller testing					
	Exp 7: Data aquisition of propeller for various wind conditions					
	History Of Control Systems		Why automatic control? Categorization of control systems		study of flight control equipment and integrated systems	control systems
	Types Of Control System		Block diagrams, the effect of feedback		Examples of control systems	control systems
	Transfer Function		Modeling principles		Review of complex numbers and complex functions	Transfer fucntions
	Nonlinearities & Linearization		Block diagram manipulations, Mason' rule		Laplace transforms	linear dynamical system models from block d
	Block Diagram & Signal Flow Graphs		Dynamic response of closed-loop systems		Solution to ordinary differential equations	linear dynamical system models from block d
	Standard Test Signals		Time-domain specifications		Transfer functions and block diagrams	Transfer functions in Matlab
	Response Of Systems		Effect of zeros		Transient response and steady-state error analysis	
	Time Domain Specifications		The Routh criterion		Stability and the Routh test	time and frequency domain
	Steady State Errors		Effect of noise, steady-state errors		The root locus	Transient and steady-state responses
	Frequency Domain Specifications		Frequency response design		Introduction to PID design using the root locus	time and frequency domain
	Bode Plots, Nyquist Plot		The root locus method		Bode plots, transfer function estimation, and Nyquist stability criterion	
	Concept Of Stability		Root locus rules		Stability and Control	Evaluate stability of open and closed loop sy
	Routh's Stability Criterion		Root locus rules, lead compensation			Root-locus tuning in Matlab
	Root Locus		Lag compensation		controller synthesis using Root Locus	Root-locus tuning in Matlab
	Controler Design Technique		Zero degree root locus		controller synthesis using Root Locus	Root-locus tuning in Matlab
LSA	PID Controller		PID control		Discrete-time fractional-order PID controller	controller from basic types (P, PI, PD, PID, lag
	Lead-Lag Controller		Bode plot problems		Bode plot problems	controller from basic types (P, PI, PD, PID, lag
	State Space Analysis		Complex poles and zeros, unstable poles, and non-minimum phase zeros			State-space in matlab, response calculation w
	Concepts Of State, State Variables And State Model		The Nyquist stability criterion		Nyquist methods	Stability in the frequency domain. Polar plot, N
	State Transition Matrix And Its Properties		Nyquist with poles on imaginary axis		Nyquist methods	Stability in the frequency domain. Polar plot, N
	Concepts Of Controllability And Observability		Stability margins, Bode gain-phase theorem			Bode diagram, non-minimum phase systems
	Solution Of State Equations – Applications		Bode compensation, Lead compensation			
			|| https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-06-principles-of-automatic-control-fall-2012/lecture-notes/		AAE 36401: Control Systems Laboratory - School of Aeronautics and Astronautics - Purdue University	
					AAE 36400: Control Systems Analysis - School of Aeronautics and Astronautics - Purdue University	
	Exp 1: Construction of Mass-Spring-Damper in simulink					
	Exp 2: Design and simulation of DC motor for various load conditions					
	Exp 3: Time response anlayais of closed loop system					
	Exp 4: Stability analysis using root locus in matlab					
	Exp 5: Design a PID control for the given transfer function					
	Static And Dynamic Stability		Equilibrium States, Aircraft Performance, Introduction to Basic Terms			
	Controllability, Requirements Of Control Surfaces		Static Stability Aircraft SS (Longitudinal), Wing/Tail Contributions		Modeling of systems with aerodynamic forces	
	Criteria For Longitudinal Static Stability		Coordinate Systems, Euler Angles, Quaternions		State space and transfer function representation of dynamical systems	
	Neutral Point-Stick Fixed And Stick Free Aspects		Aircraft Dynamics		Linearization	
	Static Margin		Aircraft Dynamics		Nonlinear model of flight vehicle dynamics	
	Elevator Control Effectiveness, & Elevator Control Power		Aircraft Longitudinal Dynamics		Linear model of flight vehicle dynamics	
	Stick Force Gradient And Stick Force Per G-Maneuver Point		Approximate Longitudinal Dynamics Models		Modes and dynamic behavior of linear systems	
	Directional Stability-Contribution To Static Directional Stability		Aircraft Lateral Dynamics, Spiral, Roll, and Dutch Roll Modes		Flight vehicle modes: phugoid, short period, dutch roll, roll and spiral	
	Power Effects On Directional Stability		Basic Longitudinal Control		Stability, flying handling qualities	
	Directional Control, Rudder Control Effectiveness		State Space Control		Feedback control	
	Lateral Stability-Dihedral Effect		Aircraft Lateral Dynamics		Controllability	
	Lateral Control, Aileron Control Power, Aileron Effectiveness		Aircraft Lateral Autopilots		static and dynamic stability	
	Dynamic Stability-Longitudinal Dynamics		Aircraft Longitudinal Autopilots, Altitude Hold and Landing			
	Aerodynamic Forces And Moments		Equations of Motion in a Nonuniform Atmosphere, Gusts and Winds		Aerodynamic stability derivatives	
	Decoupling Of Longitudinal And Lateral-Directional Equations		Lateral Stability Derivatives		Stability augmentation	
	Small Disturbance Theory, Estimation Of Longitudinal Stability Derivatives		Stability derivatives and coefficients		Stability augmentation	
ASC	Routh's Discriminant, Solving The Stability Quadratic,		The Routh-Hurwitz Criterion			
	Phugoid Motion-Damping		Approximate Aircraft Dynamic Models		Flight vehicle modes: phugoid, short period, dutch roll, roll and spiral	
	Lateral And Directional Dynamics		Aircraft Lateral Dynamics		flight vehicle dynamics	
	Stability Derivatives For Lateral And Directional Dynamics		Lateral Stability Derivatives		stability derivatives and control effectiveness	
	Dutch Roll And Spiral Instability		Spiral, Roll, and Dutch Roll Modes		Flight vehicle modes: phugoid, short period, dutch roll, roll and spiral	
	Auto Rotation And Spin		Spiral, Roll, and Dutch Roll Modes		Flight vehicle modes: phugoid, short period, dutch roll, roll and spiral	
			Inertial Sensors, Complementary Filtering, Simple Kalman Filtering		AAE 42100: Flight Dynamics and Control - School of Aeronautics and Astronautics - Purdue University	
			System Identification			
			Model Validation			

Course Name	Vel Tech	My Ref	MIT, USA	Stanford	Purdue Univ	Delft University of Technology
	Exp 1: State space modelling using matlab		Lecture Notes | Aircraft Stability and Control | Aeronautics and Astronautics | MIT OpenCourseWare			
	Exp 2: Flight data aquisition using simulator					
	Exp 3: Simulate the longitudinal flight dynamics for the given Aircraft parameters					
	Exp 4: Design a Simple Altitude-hold Autopilot system for the given flight model					
IAE	History and Introduction of Aeronautical Engineering National and International development startegy		A Brief History of Flight, Introduction to Engineering		History Of Flight	General knowledge of aircraft and their syster
	Evolution of Air Transportation: Urban Air Mobility		Introduction to Engineering		Air transportation system design and operations	Air Mobility Vehicle
	Classification of Aircrafts: Exploring HTA and LTA		Design: Lighter-Than-Air (LTA) Vehicle Module			
	Aircraft Anatomy: Parts and functions of different aircrafts		Aircraft Performances			Derive aircraft performance diagram and fligh
	Exploring Wings: Different types and its significance		Aircraft Performances		Properties of wing and fuselage sections	Derive aircraft performance diagram and fligh
	Exploring Tail: Different types and its significance		Aircraft Performances		Properties of wing and fuselage sections	Derive aircraft performance diagram and fligh
	Aircraft Structures: Anatomy of fuselage and wings, introduction to aircraft materials		Introduction to Structural Engineering		structures	Structure & Materials: stress and dimensions
	Aircraft classification: Power and speed		**Aircraft Propulsion**		Classification of aerospace propulsion systems	Derive power & efficieny equations
	Power plant: Introduction to IC engines, propellers and thrust		**Aircraft Propulsion**		Thrust equation and propellers	Derive power & efficieny equations
	Rockets: Types and principles		ROCKET PERFORMANCE LAB		Rockets: Rocket types and performance parameters; The rocket equation; Staging; Space and launc	List/describe the reasons for going into space
	The Atmosphere: Altitude and its effects on pressure, temperature and density		The Space Environment: An Engineering Perspective		Earth-atmosphere	Derive & apply atmospheric calculations
	Four forces: Evaluation Lift and Drag		Aerodynamics		forces of flight	Know and apply forces on an aircraft: Lift, dra
	Drag and its components		Aerodynamics		Aerodynamics and performance	Know and apply forces on an aircraft: Lift, dra
	Aerofoil: Angle of attack and pressure distribution		Aerodynamics		Aerodynamics and performance	Know and apply forces on an aircraft: Lift, dra
	Aerofoil: Characteristics (Ar, W/S, CoP, Aerodynamic center)		Introduction to Airplane Stability and Control		Introduction to aerodynamics	Derive & Apply equations for moments, stabili
	Aircraft: Introduction to maneuvers, mathematical model		Introduction to Airplane Stability and Control		Introduction to aerodynamics	Determine elementary satellite orbits, transfer
	Exp 1: Prototyping of various types of aircraft wings				https://engineering.purdue.edu/AAE/academics/course-descriptions/AAE251.html	
	Exp 2: Prototyping of various types of aircraft tails					
	Exp 3: Prototyping of various types of aircraft fuselage					
	Exp 4: Prototyping of flight control surfaces					
	Exp 5: Assembling of aircraft components					
Aircraft Design	Introduction to Design					
	Engineering Design					
	Design Project Planning					
	Decision Making					
	Feasibility Analysis					
	Design Requirements					
	Primary Functions of Aircraft Components					
	Aircraft Configuration Alternatives					
	Aircraft Classification and Design Constraints					
	Configuration Selection Process and Trade-Off Analysis					
	Conceptual Design Optimization					
	Maximum Take-Off Weight Estimation					
	Wing Area and Engine Sizing					
	Wing design - Number of Wings, Wing Vertical Location, Airfoil Section					
	Aircraft Tail Design					
	Fuselage and cockpit Design					
	Propulsion System Design					
	Landing Gear Design					
	Weight of Components					
	Aircraft Weight Distribution					
	Design of Control Surfaces					
	Exp 1: Setting of Design Requirements, Collection of existing aircrafts data					
	Exp 2: Comparative graphs preparation, Preliminary Estimation					
	Exp 3: Generation of Multiple Models, Evaluation of Conceptual Design					
	Exp 4: Design Calculations - Airframe design calculation, Estimation of weights					
	Exp 5: Propulsion system calculation, Power plant selection					
	Exp 6: Aerofoil selection, Wing tail and control surfaces					
	Exp 7: Estimation of Drag					
	Exp 8: Preparation of layouts of weight balance diagram					
	Exp 9: Preparation of aircraft drawings - orthographic projection					
	Exp 10: Performance calculations of your aircraft					
	Exp 11: Position of CG and detailed design summary					
	NA	Computer science - Real time lang	What is computation?	Course overview	Time domain analysis and Fourier series (6)	
	NA	Control systems - Design and Vali	Branching and Iteration	mobile robot kinematics	The fast Fourier transform (5)	

Course Name	Vel Tech	My Ref	MIT, USA	Stanford	Purdue Univ	Delft University of Technology
Embedded Systems for Aeronautical Engineers	NA	Electronic - Digital representation c	String Manipulation, Guess and Check, Approximations, Bisecti	Introduction to the Robot Operating System (ROS)	Estimating sinusoids in noise with Aerospace Applications (3)	
	NA	Hardware and software synthesis and	Decomposition, Abstractions, Functions	Trajectory optimization	Laplace transform review (5)	
	NA	Energy - 63 h Actuator and converter	Tuples, Lists, Aliasing, Mutability, Cloning	Trajectory tracking & closed loop control	Resistor, capacitor, inductors, operational amplifiers (4)	
	NA	Networks - 63 h Embedded networks:	Recursion, Dictionaries	Motion planning I: graph search methods	State space analysis (4)	
	NA	Embedded systems engineering - App	Testing, Debugging, Exceptions, Assertions	Motion planning II: sampling-based methods	Mass spring damper systems (3)	
	NA	Embedded systems engineering - Co	Object Oriented Programming	Robotic sensors & introduction to computer vision	Tuned vibration damper (2)	
	NA		Python Classes and Inheritance	Camera models & camera calibration	Bode Plots (5)	
	NA		Understanding Program Efficiency, Part 1	Image processing, feature detection & description	Resonance frequencies (2)	
	NA		Understanding Program Efficiency, Part 2	Information extraction & classic visual recognition	Butterworth filters (4)	
	NA		Searching and Sorting	Intro to localization & filtering theory		
	NA			Parameteric filtering (KF, EKF, UKF)		
	NA			Nonparameteric filtering (PF)		
	NA			EKF localization		
	NA			EKF SLAM		
	NA			Multi-sensor perception & sensor fusion		
	NA			Software for autonomous systems		
	NA			State machines		
	NA			Decision making under uncertainty		
	NA			Reinforcement learning		
	NA			Final project demo		
		https://www.isae-supaero.fr/IMG/pdf/ms_ems_2016.pdf				

	Programme Outcome		Eng Mechanics	Airplace Performance	LSA	ASC	IAE	AD	ASI	AVI	Embeded	ROS
Domain Specific Knowledge and Reasoning	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems Apply _____ mathematics to solve _______ complex engineering problem Apply _____ science concepts to solve ________ complex engineering problem Apply ______ engineering to solve ______ complex engineering problem Apply ______ Aerodynamics / Propulsion / Structure / FMC concept to solve _____ (Specialization topic) problem	PO1	Apply Freebody diagrom concepts to find Moment of Inertia for the given engineering structure									
			Applylaws of motion to identify motion characteristics of moving objects									
			Apply kinetic energy concepts to solve impact among multiple bodies	Apply solid-fluid interactions to estimate drag polar of the given airplane flight envelope	Apply linerization concepts to construct block & signal flow diagram of the given system		Classify the flying vehicles & map its applications		understand the internal systems of the aircraft			
	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. Identify _____ (Domain) concepts using _______ technique / method Formulate ______ (Domain) concepts using _______ technique / method Collect solution methods in _____ (Domain) concepts using _______ technique / method to select suitable technique to solve ______ complex engineering problem Analyze the _____ (domain) problem to identify _____ solution	PO2		Identify effects of altitude & forward speed on aircraft performace using analytical & simulation studies			Understand the performance, structural, aerodynamic & propulsive charteristics of the given aircraft		Compare the sensors with aircraft motion			
	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. Identify public health & safety / cultural / societal and environmental needs for designing ________ (Domain) system / machine / technique / methodology / vehicle Design solutions for solving _____ (topic and domain) complex problems and argue its effects on _______ (public health & safety / cultural / societal and environmental)	PO3		Design airplane for given requiremnts & estimate fuel quantity & V-n diagram		Develop mathematical modelling for the given aircraft parameters & simulate it using computational techniques		Design aircraft for the given requirements by understaning design thinking principles		Design the avionics system for the given aircraft using simulation techniques		
Professional and personal Skills	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. Design the_______ experiment / problem / methodology to learn / solve / practice ______ (domain & problem / topic / technique) Analyze the data from ______ experiment / problem / methodology to learn / solve / practice ______ (domain & problem / topic / technique) Interpret the _______ (domain & problem / topic / technique) solutions to synthesis the _______ (topic/problem/experiment & domain) problem solving methodology	PO4			Interpret the system output using time domain & frequency resposne analysis		Understand the anatomy of flying vehicles & map its functions			Compare various high end conckpit systems		
	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. Develop _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Identify _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Apply _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Identify (limitations / saturated phenomena) of _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to estimate _______	PO5				Identify stability of the developed aircraft mathematical model & select appropriate correction technique for inflight correction						
	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. Investigate _______ (Solution/technique/practice) of______ (domain & problem) to interpret ______ (societal, health, safety, legal and cultural issues) problems. Explain professional practices on ______ (domain & problem)	PO6										
	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. Design ____ (solution/technique/methodology & domain) to fulfill ______ (societal and environmental) norms of local governance Practice / identify / formulate / design sustainable development product on ________ (Domain & problem / vehicle / product / system)	PO7										
	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. Explain DGCA rules for ___________ (practice / design / problem / product / vehicle & domain) Explain FAA rules for ___________ (practice / design / problem / product / vehicle & domain) Explain ICAO rules for ___________ (practice / design / problem / product / vehicle & domain) List professional practices in DGCA / FAA / ICAO for _______ (domain)	PO8						Explain FAA rules for aircraft design				
Interpersonal Skills & Lifelong Learning	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings Practice presentation / report writing / data gathering skills on _______ (Domain & Problem) Practice team work by ________ (Domain & Problem)	PO9						Practice presentation / report writing / data gathering skills on aircraft design				
	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. Conduct product survey on ___________ (Domain & Problem) Conduct customer survey on ________ (Domain & Problem) Document ______ on ________ (Domain & Problem) as per _____ standard Explain _____ (Domain & Problem) by oral presentation Prepare project report / IV report / Training report / case study on ______ (Domain & Problem)	PO10						Conduct product survey for given aircraft				
	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. Prepare a team to solve _______ (Domain & Problem) Investigate ______ (Domain & Problem) to identify suitable _____ Develop time chart and budget to carryout ______ (Domain & Problem) Conduct meetings to record _____ (Domain & Problem) status	PO11						Prepare a team to design aircraft				
	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 Select suitable resource / course / literature for _____ (Domain & Problem)	PO12						Select suitable literature for selected aircraft type				

	Programme Outcome		Eng Mechanics	Airplace Performance	LSA	ASC	IAE	AD	ASI	AVI	Embeded	ROS
Aerospace System Design & CDIO attributes	Programme Specific Outcomes Practice design thinking and realize engineering solutions and its impact on business and societal Identify problem in ___________________ Collect ____________product information with respect to business / technical point of view Compare _____________ products to identify _________________ List environmental aspects on _______________ problem	PSO1									Compare software - hardware integration tecniques for aircrat	Identify applications of RoS in UAV
	Conceive aerospace and related engineering systems and practice designing of complex systems by understanding requirements, system modeling and business. Apply ______________ to identify ________________ (problem definition short) Analyze solutions methods for ____________________ (problem) Select ______________ solution method for ________ (problem) List requirements for __________________ (problem) Design ________ (System / simulation /process/product) with _______ (constrains) Develop ________ (System / simulation /process/product) with _______ (constrains) Interpret the _________ (developed / designed solution) for _______ (problem)	PSO2									Develop given aircraft subsystem	Develop navigation system with given constrain for drones
	Implement best solutions by practicing hardware and software integration, sensing, and simulations; Operate complex engineering systems and understand mission requirements and operation environment. Integrate ____________ system with ________________ Integrate and test the performance of _______________ Test the simulation results of ___________________ and identify ____________ Conduct functional test and estimate ________ parameters of ________ (designed / developed) Identify mission requirements of ________ (activity / task) of the ______ (problem) Troubleshoot the given problem / process / product / simulation and analyze the mission _____	PSO3			Develop mathematical model of the given system & appropriate control technique of the given system	Conduct functional test of developed autopilot & estimate its stability	Integrate the aircraft sub componets & estimate its functionality	Test the simulation results of designed aircraft and compare with the mission requiremnts	Conduct functional test on aircraft ground handeling & servicing	Simulate aircraft subsystems, instruments & DAQ	1. Conduct functional test of the developed system 2. Troubleshoot the fundtional test & develope technical manual	1. Conduct functional test of the developed system 2. Troubleshoot the fundtional test & develope technical manual

DOMAIN	PROPULSION		DOMAIN COORDINATOR	KIRUBADURAI B		
PROPOSED	**DESIGNED BY**	**VEL TECH**	**MIT, USA**	**TOKYO TECH**	**IMPERIAL COLLEGE LONDON**	**GEORGIA INSTITUTE OF TECHNOLOGY**
THERMODYNAMICS & HEAT TRANSFER	RAKESHKUMAR C	AETD, Heat Transfer	Thermal Energy	Heat transfer, Thermodynamics	Thermodynamics and Heat transfer	Kinetics and Thermodynamics of Gases
		TD LAB				
PROPULSION & FLOW THROUGH A JET ENGINE	NITHYA S	AGTP	INTRODUCTION TO PROPULSION SYSTEMS		PROPULSION AND TURBOMACHINERY	TURBINE ENGINE AERO THERMODYNAMICS
		PL LAB				
ROCKET AND SPACE PROPULSION	GANESAN S	RSP	Aerospace Propulsion		Advanced Propulsion	Rocket Propulsion, Electric Propulsion
GAS DYNAMICS & FUNDAMENTAL OF COMBUSTION	KIRUBADURAI B	CRJE,CFA	Compressible fluid dynamics		Compressible fluid dynamics	Propulsion and combustion
			https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-050-thermal-energy-fall-2002/syllabus/	http://www.ocw.titech.ac.jp/index.php?module=General&action=T0300&JWC=201701891&lang=EN	https://www.imperial.ac.uk/aeronautics/study/ug/current-students/modules/h401/?module=AERO40009&year=21_22	https://ae.gatech.edu/ae-graduate-courses##pc

Proposed	Skill 1	Skill 2	Skill 3	Tool 1	Tool 2	Tool 3	Tool 4
TD&HT	Ability to do design heat transfer device			Simlab	CADD	ANSYS	
Prop	Engineering Drawings	Practical and/or problem-solving skills		CATIA	CFD		Hypermesh
RSP		Practical and/or problem-solving skills	Critical thinking skills	Simlab	CFD		
Comb	Practical and/or problem-solving skills	Critical thinking skills	Intercultural skills	ANSYS	CFD	Fusion	

List of Experts Feedback Received

S No	Name	Designation	Company	Domain	Email ID
1	Gopinathan	Production Manager	Dileka Aerospace	Manufacture	dilekaaerospace@gmail.com
2	Renukadevi	CAE Engineer	Femlogic Technologi	Design & Analysi	renuaero@gmail.com
3	Manivel Mohanasundaram	HVAC Engineer	-EATON	Design & Analysi	manivel02@gmail.com
4	Anand Janakiraman	Team Lead, Engineering Data Author,	Boeing India PVT LTD, Chennai	Technical Publications	anandaero002@gmail.com
5	Duraipandian	Coordinator	TNQ Books & Journa	Publication	duraipandian.biochem.123@gmail.com

COURSE NAME	VEL TECH	MIT, USA	TOKYO TECH	IMPERIAL COLLEGE LONDON	GEORGIA INSTITUTE OF TECHNOLOGY
THERMODYNAMIC& HEAT TRANSFER	Basic concepts of Thermodynamics	Some properties of engineering cycles; work and efficiency		Energy sources	Overview and Thermodynamic Definitions
	Zeroth law and First Law of Thermodynamics	Carnot cycles		Continuum state, pure substance, phase diagram	The State Postulate and Reversible Work Modes
	Steady Flow Process with Various thermal Equipments	The Brayton cycle (jet propulsion cycle)		special case of a perfect gas	Zeroth, First, and Second Laws of Thermodynamics
	Second Law of Thermodynamics	Gas turbine technology and thermodynamics		concepts from kinetic theory	Gibbs Equation and Entropy Transfer
	Reversibility and irreversibility	Refrigerators and heat pumps; Carnot cycles in reverse		system, control volume, properties, state of a system, cycle.	Entropy Analysis for a Control Mass, and Availability Analysis for a Control Volume
	Carnot theorem and Carnot cycle	Reversibility and irreversibility in natural processes		Heat, work, energy and specific heats, continuity or mass conservation	Properties of the Enthalpy
	Basic Concepts of Entropy	Difference between free expansion of a gas and reversible isothermal expansion		1st Law: system and control volume formulations.	Useful Work for Flowing and Reacting Systems (Control Volume Analysis)
	Air Standard Cycles and Efficiency	Features of reversible processes		Cyclic heat power plants, reversible processes, 2nd law of thermodynamics, the Clausius inequality and entropy,	General Conditions for Chemical Equilibrium of a Mixture; Chemical Potential and Chemical/Phase
	Actual and theoretical PV, TS diagrams of two stroke and four stroke IC Engines	Concept and statements of the second law (Why do we need a second law?)		principle of increase of entropy	Equilibrium,Maxwell's Relations and Other Mathematical Relationships
	Air Compressors	calculation of entropy change in some basic processes		Adiabatic, isentropic definitions	State Equations for a Single Perfect Gas, a Perfect Gas Mixtures, and Imperfect Gases
	Isothermal and Isentropic efficiency of air compressors	Applications of the Second Law		speed of sound, Mach number	Equilibria of Reactions Involving Gases, Equilibrium Constant Kp and Law of Mass Action
		Gas Power and Propulsion Cycles		steady, inviscid flow of a perfect gas, phenomenon of choking.	Standard Reference States: Gibbs Free Energies and Enthalpies of Formation
		The Breguet range equation		Radiation: Simple radiative exchange between a body and an enclosure.	Mixed Phase Equilibria and Stoichiometric Reactions, Independent Reactions, and a General Method for Solving Equilibrium Composition
		Performance of the ideal ramjet		Conduction: Fourier's Law, derivation of heat conduction equation, relation to diffusion, simple applications	
		Effect of departures from ideal behavior-real cycles		Convection: dimensional analysis, correlations, simple internal and external flows	
		Work and heat transfer with two-phase media			
		The Carnot cycle as a two-phase power cycle			
		Rankine power cycles			
		Enhancement of, and effect of design parameters on, Rankine cycles Combined cycles in stationary gas turbines for power production			
		Behavior of two-phase systems			Mixed Phase Equilibria
	Basic Modes of Heat Transfer	Modes of heat transfer (conduction, convection and radiation)	Introduction (aim and outline of heat transfer)	Fourier's Law of conduction	
	One dimensional steady state heat conduction	Conduction heat transfer	Heat conduction, Heat conduction equation	derivation of heat conduction equation	Heat transfer fundamentals
	Free convection in atmosphere free convection on a vertical flat plate	Convective heat transfer	Unsteady-state heat transfer, Convective heat transfer	correlations of convective heat transfer	
	Laminar and turbulent convective heat transfer analysis in flows between parallel plates	Combined conduction and convection	Convective heat transfer (Laminar forced convection from a flat plate, Laminar forced convection in conduits)	Simple radiative exchange between a body and an enclosure.	
	Refrigeration and Air conditioning	Axiomatic statements of the laws of thermodynamics		reversible heat engines	Measurable Quantities in Thermodynamics (Specific Heats, Compressibility Coefficients, Heats of Reaction and Phase Change)
	Heat Pump	Combined first and second law expressions		concept of thermodynamic probability and the Boltzmann relation	Calculation of Changes in Thermodynamic Properties
	Types of Refrigeration Cycle	Entropy changes in an ideal gas		energy and the environment (concept of exergy).	Molar and Partial Molar Quantities
PROPULSION & FLOW THROUGH A JET ENGINE	Working of gas turbine engine	Aircraft propulsion, configuration and components		General engine layout	Propulsion system
	Engine thrust	Introduction to component matching and off design operation		Engine performance, thrust equation	component efficiency trades
	Characteristics of different jet engines	turbofan engines		Turbojet engines,Twin spool and fan engines	Classification of propulsion system
	Materials for gas turbine engines			Gas turbine (Brayton) cycle, and its use for analysis of engines	Real and Ideal Brayton Cycles
	Subsonic and supersonic inlets	Inlet or Diffusers		Subsonic and supersonic intakes	Subsonic inlet
	Flows in subsonic supersonic Inlets				Flow in subsonic inlet
	Boundary Layer Separation			boundary layer separation	Ramjet concept
	Relationship between minimum area ration and external deceleration ratio				scramjet engines
	Starting Problem of supersonic Inlets			supersonic intake failure due to boundary layer separation	Supersonic Inlet
	Modes of inlet operation				
	Axial and centrifugal compressor performance	Compressor and fans			Axial flow compressors
	velocity triangle	Velocity triangle		non-dimensional parameters of a compressor	Cascade theory
	Diffuser vane design consideration			phenomena at off-design regimes of a compressor	Secondary flows
	Prewhirl, rotation stall			Surge and rotating stall	Compressor stall/ surge
	Elementary theory for axial compressor				Active / Passive flow control
	degree of reaction, free vortex	Degree of reaction			
	Compressor blade design	Compressor blading, design and multistaging			Blade design, Loss Sources
	performance characteristics	Compressor performance maps			
	Classification of combustion chamber	Combuster		combustor types,	
	factors affecting combustor design			combustor requirements	
	combustor performance	Jet noise		Combustor performance	
	Flame tube cooling, flame stabilization	Aircraft engine noise, principles and regulation			combuster cooling
	simplex/ duplex burners	Afterburner			
	Classification of Exhaust nozzles	Exhaust nozzles		Supersonic converging-diverging nozzle	Subsonic and supersonic Nozzle
	Nozzle performance			Quasi-one-dimensional flows, choked nozzle	
	Variable area nozzle				
	Thrust reversal				
	Turbine classification	Turbines		Types of turbines	Axial flow Turbines
	Turbine performance	critical speeds and vibration		Lossess in turbine performance	Loss sources
	Velocity triangle	thermal and centrifugal stressess		Basic cascade theory	Secondary flows
	Vortex theory	Turbomachinery noise			Shock/Blade Interaction
	Blade cooling	turbine cooling			Turbine cooling design
	turbine/ compressor matching	compressor-turbine matching			Turbine / Compressor Matching
	Limiting factors in blade design	turbine solidity, massflow limits and blade temperature			Internal Blade Cooling
	Stage and overall performance	stage characteristics and degree of reaction		Repeating stage and degree of reaction	Blade Reaction
	Fundamental of chemical rocket propulsion	fundamentals of Chemical rocket propulsion			
	Operating principle	Opperating principle		Operating principle	
	Specific impulse of a rocket	specific impulse of a rocket			calculation of rocket thrust via momentum equation
	Performance considerations of rockets	performance considerations of rockets		Performance	Performance
	Internal ballistics			Properties of Solid fuel	
	Types of Igniters				Ignitors, Gas Generators
	Preliminary concepts in nozzle-less propulsion				
	Air augmented rockets - pulse rockets motors				Nozzle designs(Cone, bell, Plug)
	Static testing of rockets and intrumentation				ideal expansin / under expansion
	Safety considerations			Safety considerations	
					Solid Propellant Rocket
	Salient features of solid propellant rockets	Solid Rocket Propulsion		Solid rocket propulsion	Propellant/Fuel options
	Selection criteria of solid propellants	Properties of solid propellant			
	Estimation of solid Propellant adiabatic flame temperature			Properties of solid propellant	Propellant burning law
	Propellant grain design considerations	Propellant grain			Propellant grain design considerations
	Erosive burning in solid Propellant rockets				Effect of grain cross section shape
	Strand burner	microthrusters			
	T-burner				cold gas (N2) thrusters

ROCKET AND SPACE PROPULSION	Combustion instability				hydrazine/catalyst thrusters
	Applications and advantages of solid propellant rockets	Applications and advantages of solid propellant rockets			
				Liquid Propulsion system	Liquid Propulsion system
	Salient features of liquid propellant rockets				Monopropellant Thrusters
	selection of liquid propellants	selection of liquid propellants		Fuel Properties	thermodynamics of liquid rocket engines
	various feed systems	Propulsion feeding techniques		Propellant feeding system	turbomachinery design
	Types of injectors for liquid propellant rockets	Electrothermal, electrostatic and electromagnetic schemes for accelerating techniques		Comparison of hydrogen-air, hydrogen -oxygen and hydrocarbon -air e	Bipropellant Liquid Rocket Engines
	thrust control and cooling in liquid propellant rockets	Advanced mission analysis		Compression cooling system	propellant combinations
	heat transfer problems	Compressionless propulsion			engine cycles (gas generator, staged combustion
	combustion instability in liquid propellant rockets				
	peculiar problems associated with operation of cryogenic engines.				
				HYBRID ROCKET PROPULSION	Hybrid Rocket Propulsion
	Introduction to hybrid rocket propulsion	Introduction to hybrid rocket propulsion		Introduction to hybrid rocket propulsion	Introduction to hybrid rocket propulsion
	standard and reverse hybrid systems-	Satellite power system and their relation to propulsion system		mechanism in hybrid propellant rockets	common propellant combinations and configuration
	mechanism in hybrid propellant rockets			Applications and limitations	system performance characteristics (advantages)
	Applications and limitations	Applications		Thermodynamics analysis of turbopumps with cryogenic fuels	Historical examples
	Electric rocket propulsion	Electric Propulsion System			Electric Propulsion
	Types of electric propulsion techniques				Types
	Ion propulsion and Nuclear rocket				Electrothermal Propulsion
	comparison of performance of these propulsion systems with chemical rocket propulsion systems	Satellite power system			Electromagnetic Propulsion
	Future applications of electric propulsion systems	Application of electric Propulsion system		Analytical justification for airborne rocket launch	Electrostatic Propulsion
	Solar sail	Design and characterization of electric propulsion engines		HALE Propulsion system	
GAS DYNAMICS & FUNDAMENTAL OF COMBUSTION	Compressibility	Compressibility		Compressible flow	Compressibility
	Governing equations	Governing equations		Governing equations	Governing equations
	Compressible flow regime	Thermodynamic characteristic parameters		Wave propagation	Radiative energy transfer in gases
	Mach number, Mach cone & Mach angle	Quasi-one dimensional Flow		Quasi-one dimensional Flow	Shock waves
	Isentropic Flow	Gas Dynamic discontinuities		Compressive and expansive wave	Introduction to reaction kinetics
	Area - Velocity relation				Reaction rates and bimolecular collision models
	Area- Mach number relation				Reaction mechanisms and chain reactions
	Shock waves	Shockwaves and detonations		Shock waves	Partial equilibrium and steady-state approximations
	Prandtl's Relation				NOx kinetics
	Hugoniot Relation				H2-O2 explosions
	Fanno Flow				Global kinetic models for hydrocarbon oxidation
	Rayleigh Flow				Plug flow and well-stirred reactors
	Stoichiometry				Mass transport
	enthalpy of formation				Schvab-Zeldovich formulation
	enthalpy of combustion				Rankine-Hugoniot analysis of detonations and deflagrations
	laws of thermo chemistry				Structure of plane detonations
	pressure and temperature effect on enthalpy of formation				Chapman-Jouget detonations
	adiabatic flame temperature				Laminar flame structure
	chemical and equilibrium products of combustion				Laminar flame speed and flame thickness
	Fundamental laws of transport phenomena				Propagation limits: quenching, flammability limits, flame stabilization
	Conservations Equations				Ignition: spark and thermal ignition
	Transport in Turbulent Flow				Laminar jet mixing
	Basic Reaction Kinetics				Laminar jet diffusion flames
	Elementary reactions				Soot formation and destruction
	Chain reactions				Laminar counterflow diffusion flames
	Multistep reactions				Droplet evaporation
	simplification of reaction mechanism				Droplet burning Introduction to Turbulence
	Global kinetics				Characteristics of turbulent flows
	One dimensional combustion wave				Length and time scales
	Laminar premixed flame				Reacting flow regimes Premixed Turbulent Flames
	Burning velocity measurement methods				Length and velocity ratios
	Effects of chemical and physical variables on Burning velocity				Wrinkled and corrugated flames, flamelets in eddies
	Flame extinction and Ignition				Turbulent flame speed
	Flame stabilizations				Modeling Nonpremixed Turbulent Flames
	Turbulent Premixed flame				Fast (equilibrium) chemistry
	Gaseous Jet diffusion flame				Finite rate chemistry and flamelet models
	Liquid fuel combustion				
	Atomization				
PROPULSION LABORATORY	Study of an aircraft piston engine (includes study of assembly of sub systems, various				
	components, their functions and operating principles).				
	Study of an aircraft jet engine (includes study of assembly of sub systems, various				
	components, their functions and operating principles).				
	Forced convective heat transfer over a flat plate.				
	Free convective heat transfers over a flat plate				
	Cascade testing of a model of axial compressor blade row.				
	Study of performance of a propeller.				
	Determination of heat of combustion of aviation fuel.				
	Combustion performance studies in a jet engine combustion chamber.				
	Determination of characteristics of free jet.				
	Determination of characteristics of wall jet				
	Performance test on a 4-stroke diesel engine				
	Valve timing of a 4 – stroke diesel engine				

THERMODYNAMICS LABORATORY	Port timing of a 2-stroke petrol engine				
	Determination of effectiveness of a parallel flow heat exchanger				
	Determination of effectiveness of a counter flow heat exchanger				
	Determination of flash point and fire point of a fuel				
	COP test on a vapour compression refrigeration test rig				
	COP test on a vapour compression air-conditioning test rig				
	Determination of thermal conductivity of solid.				
	Determination of thermal resistance of a composite wall.				
	Determination of emissivity of solid.				
	Determination of viscosity of a fuel.				

	Programme Outcome-	Derived Course Outcomes from Topic Mapping & Skills and Tools Identified
Domain Specific Knowledge and Reasoning	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems Apply _____ mathematics to solve _______ complex engineering problem Apply _____ science concepts to solve ________ complex engineering problem Apply ______ engineering to solve ______ complex engineering problem Apply ______ Aerodynamics / Propulsion / Structure / FMC concept to solve _____ (Specialization topic) problem	Apply Thermodynamics knowledge to solve the performance-related problems in internal combustion and Jet Engines (Thermodynamics)
	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. Identify _____ (Domain) concepts using _______ technique / method Formulate ______ (Domain) concepts using _______ technique / method Collect solution methods in _____ (Domain) concepts using _______ technique / method to select suitable technique to solve ______ complex engineering problem Analyze the _____ (domain) problem to identify _____ solution	Analyze The Heat Transfer problem to calculate the Thermal resistance and heat Flux (Heat transfer)
	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. Identify public health & safety / cultural / societal and environmental needs for designing ________ (Domain) system / machine / technique / methodology / vehicle Design solutions for solving _____ (topic and domain) complex problems and argue its effects on _______ (public health & safety / cultural / societal and environmental)	Identify the Environmental needs for Designing the Electric propulsion system to accelerate the vehicle by electrical and magnetic means. (Electirc propulsion)
ersonal Skills	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. Design the_______ experiment / problem / methodology to learn / solve / practice ______ (domain & problem / topic / technique) Analyze the data from ______ experiment / problem / methodology to learn / solve / practice ______ (domain & problem / topic / technique) Interpret the _______ (domain & problem / topic / technique) solutions to synthesis the _______ (topic/problem/experiment & domain) problem solving methodology	Design different types of Nozzles, propellers to learn the different flow losses and factors affecting the performance. (Propulsion and flow through the jet engine)
	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. Develop _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Identify _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Apply _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Identify (limitations / saturated phenomena) of _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to estimate _______	Identify the limitations of the solid rocket motors and liquid rocket engines to estimate the Performance factors like Specific Impulse. (Propulsion II)

Professional and p	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. Investigate _______ (Solution/technique/practice) of______ (domain & problem) to interpret ______ (societal, health, safety, legal and cultural issues) problems. Explain professional practices on ______ (domain & problem)	Investigate the combustion rate to overcome the different types of combustion instabilities (Thermodynamics and fundamental of combustion)
	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. Design ____ (solution/technique/methodology & domain) to fulfill ______ (societal and environmental) norms of local governance Practice / identify / formulate / design sustainable development product on ________ (Domain & problem / vehicle / product / system)	
	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. Explain DGCA rules for __________ (practice / design / problem / product / vehicle & domain) Explain FAA rules for __________ (practice / design / problem / product / vehicle & domain) Explain ICAO rules for __________ (practice / design / problem / product / vehicle & domain) List professional practices in DGCA / FAA / ICAO for ______ (domain)	
Interpersonal Skills & Lifelong Learning	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings Practice presentation / report writing / data gathering skills on _______ (Domain & Problem) Practice team work by ________ (Domain & Problem)	Practice data gathering skills on different rocket propulsion systems with its specifications and operating principles(Propulsion II)
	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. Conduct product survey on __________ (Domain & Problem) Conduct customer survey on ________ (Domain & Problem) Document ______ on ________ (Domain & Problem) as per ____ standard Explain _____ (Domain & Problem) by oral presentation Prepare project report / IV report / Training report / case study on _____ (Domain & Problem)	Explain the importance of propulsive force in aircrafts by oral presentation (Propulsion and flow through the jet engine)
	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. Prepare a team to solve _______ (Domain & Problem) Investigate ______ (Domain & Problem) to identify suitable ____ Develop time chart and budget to carryout ______ (Domain & Problem) Conduct meetings to record _____ (Domain & Problem) status	Investigate the necessity of heat transfer, maintenance of temperature and control of it to identify suitable cooling system in aircrafts and rockets (Heat transfer and thermodynamics)

	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 Select suitable resource / course / literature for _____ (Domain & Problem)	
Aerospace System Design & CDIO attributes	Programme Specific Outcomes Practice design thinking and realize engineering solutions and its impact on business and societal Identify problem in ___________________ Collect ____________product information with respect to business / technical point of view Compare _____________ products to identify _________________ List environmental aspects on _______________ problem	Compare different propulsion systems to identify its specific applications and limits in use
	Conceive aerospace and related engineering systems and practice designing of complex systems by understanding requirements, system modeling and business. Apply ______________ to identify ________________ (problem definition short) Analyze solutions methods for ____________________ (problem) Select ______________ solution method for ________ (problem) List requirements for __________________ (problem) Design ________ (System / simulation /process/product) with _______ (constrains) Develop ________ (System / simulation /process/product) with _______ (constrains) Interpret the _________ (developed / designed solution) for _______ (problem)	Design the jet engine inlet and nozzle and do the simulation with its design constraints
	Implement best solutions by practicing hardware and software integration, sensing, and simulations; Operate complex engineering systems and understand mission requirements and operation environment. Integrate ____________ system with ________________ Integrate and test the performance of ______________ Test the simulation results of ___________________ and identify ____________ Conduct functional test and estimate ________ parameters of ________ (designed / developed) Identify mission requirements of ________ (activity / task) of the ______ (problem) Troubleshoot the given problem / process / product / simulation and analyze the mission _____	Conduct functional test and estimate the key parameters deciding the performance of the jet engines

Domain	Structues		Domain Coordinator	Name	Boopathy G	
Proposed	**Designed by**	**Vel Tech**	**MIT**	**Stanford**	**Georgia Tech**	Nanyang Techr
Solid Mechanics	Mr. G.Boopathy	Strenth of Materials	Unified Engineering: Materials and Structu	Introduction to Solid Mechanics	Structural Analysis	
Aircraft Structural Mechanics	Dr. Joseph	Aircraft Structural Me	Structural Mechanics	Lightweight Structures	Advanced Structural Analysis I	Aircraft Structu
Aircraft Structural Analysis	Dr. JV Sai Prasanna					
Finite Element Analysis	Mr.S.Kolappan	Finite Element Metho	Computational Modeling and Data Analysis in Aerospace Engineering	Aerospace Computational Scien	Finite Element Analysis	
Tinkering Lab	Dr. JV Sai Prasanna					
			Link for syllabus from Uni A	Link for syllabus from Uni B	Link for syllabus from Uni C	
		1151AE215AIRCRAF	Syllabus | Structural Mechanics | Aeronau	AA151 Course | Stanford Univers	AE6100.PDF (gatech.edu)	MA3700 Aircra
						Saturday, June
						Aeronautical E

Proposed	Skill 1	Skill 2	Skill 3	Skill 4	Tool 1	Tool 2
ASA	Basic maths	Linear Algebra	Design of experiments	Abilty to interpret the result	ANSYS	MATLAB
ASM						
SM						
FEM						

List of Experts Feedback Received					
S No	Name	Designation	Company	Domain	Email ID
1	Gopinathan	Production Mana	Dileka Aerospace	Manufacturing	dilekaaerospace@gmail.com
2	Grish	Techinical Head	BAIL	Design and manufacturing	grish@bailindia.com

Course Name	Vel Tech	MIT	Stanford	Georgia Tech	Nanyang Technological University-Singapore
Solid Mechanics	Classification of Loads	Dimensions and units	Normal strain under axial loading	Stress/Strain Relationships	
	Stress and Strain	Coordinate systems	Stress-strain diagram	Material Properties	
	Poisson's Ratio	concept of force	Hooke's law; modulus of elasticity	Euler Bernoulli beam theory	
	Elastic Constants	forces: line of action, summation of forces	Deformation of members under axial loac	3D beam theory	
	Thermal Stress	Moments	Poisson's ratio, generalized Hooke's law	Torsion of beams	
	Compound bar	moment about a point	relations among E, K, and G	Thin-walled beams	
	Composite Section	moment about an axis	Deformation of a circular shaft	Semi-monoque Structural Design and Sizing	
	Classification beams	couples	Angle of twist	Virtual work principles	
	Shaer Force and Bendind Moment	support and reaction forces	Design of transmission shafts	Energy methods	
	SFD & BMD for Cantelever	Free body diagram	Pure Bending	Concept of buckling - Buckling of beams	
	SFD & BMD for SSB	statically determinate	Shear and bending moment diagrams	Finite Element theory for trusses and beams	
	Theory of simple bending	statically indeterminate	Determination of shearing stresses in a beam		
	Relation between Slope,Deflection and Radius of curvature	Concept of stress	Transformation of plane stress		
	Slope and deflection at a section	stress tensor	Mohr's circle for plane stress		
	Double Integratin Method	Concept of strain	Stresses in thin-walled pressure vessels		
	Macaulay's Method	strain tensor	Stresses under combined loadings		
	Moment Area Method	Material properties	Equation of the elastic curve		
	Torsion Equation	Classes of materials (metals, ceramics, polymers, composites)	Euler's formula for pin-ended beams		
	Torsion of solid and hollow shafts	Definition of a rod	Euler's formula for pin-ended beams		
	Power transmitted by the shaft	Shear and Moment diagrams			
	Helical springs	Simple Beam theory			
	Thin Cylindrical Shells	parallel axis theorem			
	Thin Spherical Shells	Torsion of a (circular) shaft			
	Principal stresses				
	statically determinate				
	statically indeterminate				
FInite Element Analys	Governing Equations				
	Discrete and continuous models				
	Boundary, Initial and Eigen Value problems				
	Weighted Residual Methods				
	One Dimensional Second Order Equations				
	Discretization				
	Element types- Linear and Higher order Elements				
	Derivation of Shape functions and Stiffness matrices and force vectors				
	Natural frequencies of beams				
	Second Order 2D Equations involving Scalar Variable Functions.				
	Triangular elements				
	Thermal problems				
	Torsion of Non circular shafts				
	Dynamic Analysis: Modal analysis of Bars and Beams				
	Plane stress, plane strain and axisymmetric problems				
	Body forces and temperature effects				
	Plate and shell elements				
	Isoparametric elements				
	One and two dimensions – Serendipity elements				
	Numerical integration and application to plane stress problems				
	Symmetric Bending	Bending of symmetrical sections		Euler bernoulli beam theory	
	Unsymmetric Bending	Bending of unsymmetrical sections		3 D beam theory	
	Determination of MI				

	Generalized method				
Aircraft Structural Analy	Neutral axis and Principal axis method				
	Concept of shear flow and shear center				
	Shear flow concepts with one axis and both axis of sym	Shear in thin walled sections	Deformation of stress	Thin walled beams	
	Shearflow with webs effective and in effective in bendin	Shear in unsymmetrical sections			
	Shear flow in closed sections				
	Shear flow in multicell closed cells		monocoque structures		
	Cells with webs effective iand ineffective in bending	torsion of thin walled sections		Torsion of thin walled beams	
	Buckling of Sheet stiffner panels, plates	Buckling of thin walled shells/beams	Thin plate analysis	Concept of buckling -beams columns	
	Thin walled columns	Stability in columns	Stability and buckling		
	loads on fuselage and wings				
	Static analysis of airecraft structural components	General design of aerospace structures		V-N diagrams static analysis of aircraft components	
	Semi tension field beams				
	Rivetting, Welding and Operations in lathe				
	Mould making with cnc router				
	Milling operations using VMC				
	Plastics from injection mold making				
Tinkering Lab	3D Printers for fabricating Complex geometries				
	Analysis of plane truss	Material origins of strength	stress-strain behavior	Instability and Buckling/Postbuckling	Equation of the elastic curve
	Composite beam	strength of perfect crystals: atomic energy cu	Concept of yielding	Mechanical Rigid Member Models	Singularity function
	Clapeyron's Three Moment Equation	weakest link analogy	the stress-strain curve: brittle vs. ductile b	Elastic Buckling of Columns.	Column
	Moment Distribution Method	dislocations	definition of yield stress	Effect of boundary conditions.	Euler's formula for pin-ended beams
	Strain Energy due to loads	methods to stop/delay yielding - hardening	beam bending	The Southwell plot.	Extension of Euler's formula
	Castigliano's theorem	Yielding and shear stress	Columns end conditions	Buckling of Frames	torsion and shear
	Maxwell's Reciprocal theorem	yielding at structural level	Euler's Column curve	Energy-Based Methods	Effect of Axial constraints
	Unit load method	von Mises criterion	Column with initial curvature	Timoshenko's method.	Buckling phenomenon in columns and plates
	Columns end conditions	Tresca condition	Eccentric loading	Rayleigh and Timoshenko quotient.	Exact and energy approach to solving buckli
	Euler's Column curve	Creep and creep rupture	South well plot	Buckling of beam-columns on elastic foundation	
	Rankine's formula	effects of time and temperature	Beam column	Torsional Buckling	
	Column with initial curvature	viscoelasticity	torsion	Lateral Buckling of Beams	
	Eccentric loading	viscoplasticity.	thin-walled structures		
	South well plot	Concept of yielding	design of airframes		
	Beam column	the stress-strain curve: brittle vs. ductile beha	high-altitude balloons		
raft Structural Mechar	Ductile and Brittle Materials	definition of yield stress	solar sails.		
	Maximum Stress theory	Simple Beam theory			
	Maximum Strain Theory	moment-curvature relation			
	Maximum Shear Stress Theory	statically indeterminate beams			
	Distortion Theory	concept of stability			
	Maximum Strain energy theory	definition of elastic instability			
		stability of discrete systems			
		buckling/bifurcation			
		eigenvalues/vectors and buckling loads/modes			
		continuous systems			
		buckling of a column			
		derivation of governing equation.			

		Euler buckling load			
		cantilever case			
		other boundary conditions.			
		Types of imperfections			
		deflection of column under eccentric loading			

S	Programme Outcome ASA	Derived Course Outcomes from Topic Mapping & Skills and Tools Identified
Domain Specific Knowledge and Reasoning	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems Apply _____ mathematics to solve _______ complex engineering problem Apply _____ science concepts to solve ________ complex engineering problem Apply ______ engineering to solve ______ complex engineering problem Apply ______ Aerodynamics / Propulsion / Structure / FMC concept to solve _____ (Specialization topic) problem	S1 Derive and develop the geometrical properties using basic mathematical skills.
	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. Identify _____ (Domain) concepts using _______ technique / method Formulate ______ (Domain) concepts using _______ technique / method Collect solution methods in _____ (Domain) concepts using _______ technique / method to select suitable technique to solve ______ complex engineering problem Analyze the _____ (domain) problem to identify _____ solution	S2. Formulate the relations between shear loads on the structural elements and identify the methods that are best suitable to understand the behaviour of the element.
	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. Identify public health & safety / cultural / societal and environmental needs for designing ________ (Domain) system / machine / technique / methodology / vehicle Design solutions for solving _____ (topic and domain) complex problems and argue its effects on _______ (public health & safety / cultural / societal and environmental)	S3. Design solutions for solving the interaction of loads on the wing of an airctaft and thus setting celiling on safety to material, personel and passengers

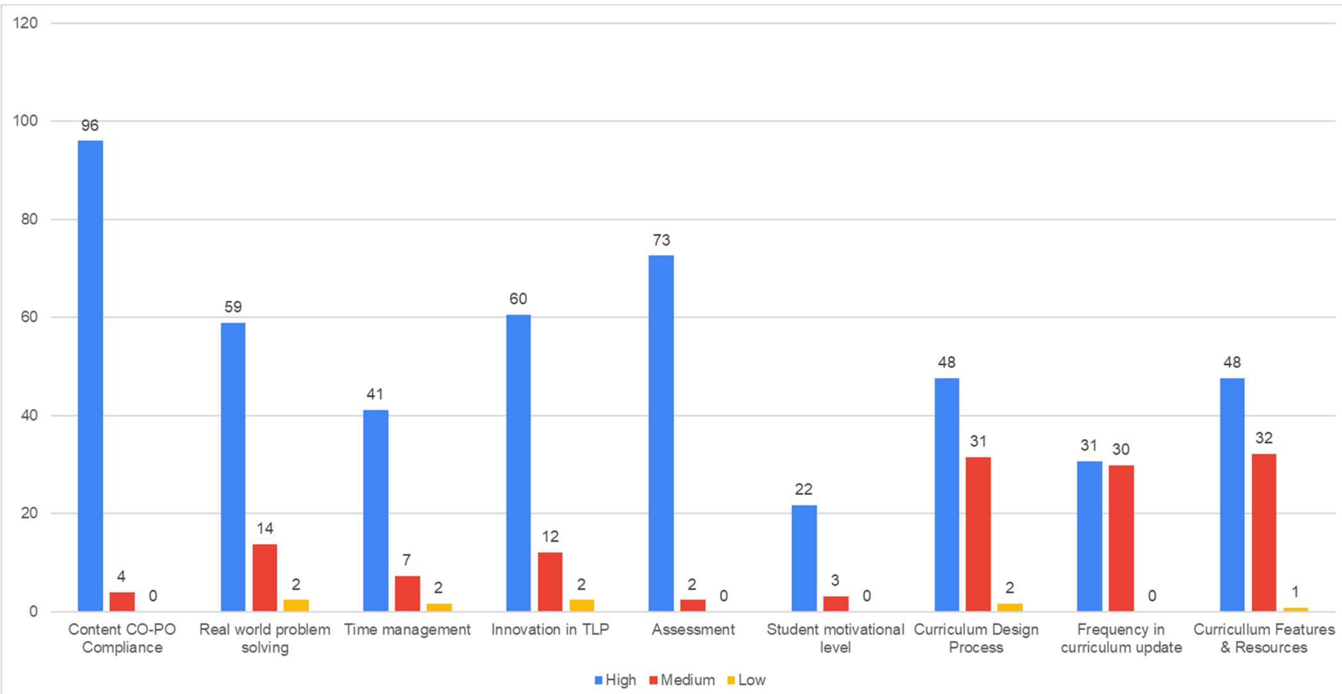
Professional and personal Skills	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. Design the_______ experiment / problem / methodology to learn / solve / practice ______ (domain & problem / topic / technique) Analyze the data from ______ experiment / problem / methodology to learn / solve / practice ______ (domain & problem / topic / technique) Interpret the _______ (domain & problem / topic / technique) solutions to synthesis the _______ (topic/problem/experiment & domain) problem solving methodology	S4. The kowledge gained will enable a student ro identiy an element of the aircract winhg structure, identify its nature of foces and experimentally interations of eccentric loads.
	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. Develop _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Identify _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Apply _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to solve _________ Identify (limitations / saturated phenomena) of _________ (domain & problem) (techniques / resources on modern engineering / IT tools) to estimate _______	S5.The complete design of an experiment ans its subsquent strain measurement using sgtrain indicators for a thin walled section and automate it with software tool-python
	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. Investigate _______ (Solution/technique/practice) of______ (domain & problem) to interpret ______ (societal, health, safety, legal and cultural issues) problems. Explain professional practices on ______ (domain & problem)	S6 The plot shear force distribution & BMD of the wing will help in understanding the celings put on the material behaviour and thus ensuring the safety to material, men and funds
	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. Design ____ (solution/technique/methodology & domain) to fulfill ______ (societal and environmental) norms of local governance Practice / identify / formulate / design sustainable development product on ________ (Domain & problem / vehicle / product / system)	S7.With the knowledge gained a small part to be fabricated and tested to demonstrate the sustainability according to norms. Use alternate materials to develop a small fuel tank and check for its sustainability according to norms.

	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. Explain DGCA rules for ___________ (practice / design / problem / product / vehicle & domain) Explain FAA rules for ___________ (practice / design / problem / product / vehicle & domain) Explain ICAO rules for ___________ (practice / design / problem / product / vehicle & domain) List professional practices in DGCA / FAA / ICAO for ______ (domain)	S8. Ability to understand DGCA rules for plying of passengersrules for inspecting the aircract , analysing aircaft crash senerios will help in understaninf the implications of the DGCA/FAA rules and understanding rules for chartered flights/ private flights and for phrobitive flying.
Interpersonal Skills & Lifelong Learning	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings Practice presentation / report writing / data gathering skills on _______ (Domain & Problem) Practice team work by ________ (Domain & Problem)	S9.Ability to generate a report individually/ team on starin measurements on wing and the Abilty to communicate the findinf effectively on project on stain measurements of the wing
	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. Conduct product survey on ___________ (Domain & Problem) Conduct customer survey on ________ (Domain & Problem) Document ______ on ________ (Domain & Problem) as per _____ standard Explain _____ (Domain & Problem) by oral presentation Prepare project report / IV report / Training report / case study on ______ (Domain & Problem)	S10. Ability to communicate the findings of a survey of a component documented / orally
	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. Prepare a team to solve _______ (Domain & Problem) Investigate ______ (Domain & Problem) to identify suitable _____ Develop time chart and budget to carryout ______ (Domain & Problem) Conduct meetings to record _____ (Domain & Problem) status	S11 Ability to identify skills to manage and solve a issue material failure
	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 Select suitable resource / course / literature for ____ (Domain & Problem)	S12 Study of Notems for techinical updations

Aerospace System Design & CDIO attributes	**Programme Specific Outcomes** **Practice design thinking and realize engineering solutions and its impact on business and societal** **Identify problem in ___________________** **Collect ____________product information with respect to business / technical point of view** **Compare _____________ products to identify _________________** **List environmental aspects on _______________ problem**	
	Conceive aerospace and related engineering systems and practice designing of complex systems by understanding requirements, system modeling and business. Apply _______________ to identify ________________ (problem definition short) Analyze solutions methods for ____________________ (problem) Select ______________ solution method for ________ (problem) List requirements for __________________ (problem) Design ________ (System / simulation /process/product) with _______ (constrains) Develop ________ (System / simulation /process/product) with _______ (constrains) Interpret the _________ (developed / designed solution) for _______ (problem)	
	Implement best solutions by practicing hardware and software integration, sensing, and simulations; Operate complex engineering systems and understand mission requirements and operation environment. Integrate ____________ system with ________________ Integrate and test the performance of _______________ Test the simulation results of ___________________ and identify ____________ Conduct functional test and estimate ________ parameters of ________ (designed / developed) Identify mission requirements of ________ (activity / task) of the ______ (problem) Troubleshoot the given problem / process / product / simulation and analyze the mission _____	

Department of Aeronautical Engineering

Feedback Analysis on Curriculum Design for Academic Year 2020-21



Inferences:

1. Stakeholders appreciated the following aspects in existing curriculum & its design process

Content CO-PO Compliance
Real world problem solving
Assessment
Student motivational level
Curriculum Design Process

2. Stakeholders demands improvements in following aspects in existing curriculum & its design process

Time management
Frequency in curriculum update
Curriculum Features & Resources

3. Stakeholders recommended following features to be included in curriculum

Knowledge	Tools	Skills
Aviation	Root cause Analysis - 5 why and fish bone analysis, Training matrix to track the training record of each and every individual	Legal requirements and compliance of local country, Job safety Analysis, investigate Accidents
Product Development	CAD software's like Catia, Analysis like FEM, CFD, CHT software's & Open wares	NDT, Basic engineering, Structure & composites, Design, Technical Documentation, Engineering Problem Solving, Customer support on various aviation areas.
UAV development	Python, Open CV, SolidWorks, Matlab, Mission Planner , DJI Tools, Python, Pixhawk, GIS, GCS	Scripting, Design, Mapping, Autopilot design, spraying
Manufacturing	GD&T, Design for Manufacturing, Tolerance stack up analysis, Laser cutting, CNC coding, 3D printing	People management, Logical reasoning, Process engineering, Tooling design, Meteorology, Manufacturing technologies and processes, Mathematics
Robotics	Coding, Embedded, ML	Automation
Defense	AI, 3D printing, drone technology	Satellite technology, navigation,
Management	Fish bone, pareto	Six Sigma

Recommendations:

1. Faculty members required to be submit topic mapping from different peer institutes to understand required topics & time taken to deliver the content
2. Students feedback indicates their involvement is less in curriculum design. It is recommending to include student representatives & create awareness about curriculum design process to students.
3. Most of the students felt there is a gap in proper learning resources. Faculty members shall teach students about self-learning and access of online library.
4. The new courses addressing robotics, UAV design, manufacturing shall introduce to the existing regulation and upcoming regulation students.
5. The software's, composites & coding shall incorporate as activities in appropriate courses. It is recommended to follow Project Based Learning and a committee shall constitute to implement PBL based curriculum for upcoming regulation.
6. Professional software's & open wares shall include as separate course to improve their proficiency level. GD & T shall be addressed in these courses.
7. Management related aspects shall practice in projects. The rubrics shall be developed to address these areas.
8. New specialization / programme shall evolve to address defense sector requirements.

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Aeronautical Engineering
Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Department of Aeronautical Engineering

Stakeholders Feedback Analysis

Academic Year 2020-21

Criteria	High	Medium	Low
Content CO-PO Compliance	96	4	0
Real world problem solving	59	14	2
Time management	41	7	2
Innovation in TLP	60	12	2
Assessment	73	2	0
Student motivational level	22	3	0
Curriculum Design Process	48	31	2
Frequency in curriculum update	31	30	0
Curricullum Features & Resources	48	32	1

Specific Comments on Topics / Skills / Tools

	Knowledge	Tools	Skills
Alumni	Design	Catia, CFD, CHT, Openwares	3D desining
	Manufacturing	Laser cutting, CNC coding, 3D printing	Material handling, Repair technique, Composites
	Drone Development	Python, Pixhawk, GIS, GCS	Mapping, Autopilot design, spraying
Industry	Aviation	Root cause Analysis - 5 why and fish bone analysis, Training matrix to track the training record of each and every individual	Legal requirements and compliance of local country, Job safety Analysis, investigate Accidents
	Product Development	CAD softwares & openwares	NDT, Basic engineering, Structure based knowledge, Aerospace Knowledge, Design, Technical Documentation, Engineering Problem Solving, Customer support on various aviation areas.
	Design & Analysis	CAD, FEM, CFD - Softwares & Openwares	Coding techniques
	UAV development	Python, Open CV, SolidWorks, Matlab, Mission Planner , DJI Tools	Scripting, Design.
	Manufacturing	GD&T, Design for Manufacturing, Tolerance stack up analaysis,	People management, Logical reasoning, Process engineering, Tooling design, Meterology, Manufacturing technologies and processes, Mathematics
	Robotics	Coding, Embeded, ML	Automation
	Defense	AI, 3D printing, drone technology	Satellite technology, navigation,
	Management	Fish bone, pareto	Six Sigma

Feedback Report of Faculty

Criteria	High	Medium	Low
Content CO-PO Compliance			
Course content is relevant to the course mapping	31		
Course outcome contribution towards PO attainment	30	**1**	
Course is relevant to the PSC	28	**3**	
Course outcome levels are relevant to the course content	30	**1**	
Real world problem solving			
Course content demand usage of modern tools	25	**4**	**2**
Course content addresses current industry practice	23	**8**	
Course content will serve for future industry practice	25	**5**	**1**
Time management			
Adequate time available to deliver content	26	**4**	**1**
Adequate time available to conduct Assessment	25	**5**	**1**
Innovation in TLP			
Provision to introduce new TLP method	27	**3**	**1**
Availability resources in internet	24	**7**	
Availability of resources in local library	24	**5**	**2**
Assessment			
All assessment questions are as per blooms taxonomy and CO leve	31		
Questions are relevant to CO	30	**1**	
ere is less/ no deviation among internal and external question pap	29	**2**	
Student motivational level			
Students are attentive in class	27	**4**	

Feedback Report of Student

Criteria	High	Medium	Low
Curriculum Design			
BoS is taking care of current and Relevance of the offering Progra	14	11	
Employability skills are addressed in curriculum	18	6	1
Active participation in providing suggestions in curriculum design	10	14	1
Curriculum design methodology followed by department	17	8	
Frequency in curriculum update			
The curriculum is updated regularly	15	10	
Improvements in lab experiments	8	17	
Improvements in Teaching-Learning practice	15	10	
Suggestions and Improvements			
Students Interest level in available courses (List topics to be modi	11	14	
Time available for course preparation	18	7	
Opportunity and motivation in self study	11	14	
Availability of course reference materials (List non availability of r	19	5	1

Feedback Report on Alumni

Name	Qualification with specialisation	Choose any one below which can describe your job broadly	Designation, employer, work place	List the knowledge and skill set required for your current designation	List the specific tools/techniques using in your industry	List the skill set and tools required for meeting future trends in your domain	Email Address
SADAM HUSSAIN	B. Tech Aeronautical	Design	Senior design engineer at FLSMIDTH	Good knowledge in engineering design and designing software such as catia, solidworks, autocad	Solidworks and autocad	designing Software knowledge plus material handling	
Thamaraiselvan	B. Tech Aeronautical ,specialisation maintenance	Manufacturing	Incharge, college, Meenakshi ammal institute		Work skills	Irrelevant field but future is good	
Deepak S	B.Tech., (Aeronautical)	Quality assurance	Life cycle engineer (Quest Global- Bangalore)	Engine function and operating instruction		Repair techniques and engine instrumentation	
Vignesh S M	M.Tech Sports technology	R&D	CEO, Chuvadi	Entrepreneurship, problem solving, team management, fund raising and events management.	Open form, Mathlab, Excel, python,Scilab and Ansys	Dratfish, Scilab, SimScale and Open form	
Anju		Design	Ap	Software			
Vancha Rohith Reddy	B.Tech Aeronautical Engineering	Higher Education	NA	NA	NA	Python	vtu6788@veltechuniv.edu.in
Kamal Raj	M.tec	Design	Plm engineer (Product life cycle	Design management, cad knowledge	Bombardier, Airbus, Boeing, Hal, ADA..Ect	Catia, 3d experience,	Goutham.raj.36@gmail.com
Kondaka Shiva Sankar	B.Tech Aeronautical Engineering	R&D	Project Assignee, TAFE, Thanjavur	Basic knowledge on UAV, Maintenance of UAV, Microsoft Office	Aerial Spraying & Aerial Mapping	Good knowledge on UAV, Microsoft office, GCS softwares, GIS softwares	k.shivasankar729@gmail.com
DALJIT MAJIL D	MS [Aeronautics & Astronautics]	R&D	Aerospace Engineer, Bellwether industries, Taiwan	Deep Engineering Knowledge, First Principle Thinking & Communication .	CFD	AI, Industry 4.0	daljitaero96@gmail.com
Chandrashekhar Tasupalli	Master's degree In Mechanical and electro mechanical engineering Taiwan	Higher Education	Research assistant, Tamkang university Taiwan	Design, CFD simulation, MATLAB , cadence etc.	MEMS clean room, Lazer cutting machine, 3D printer, high speed camera set-up etc.	Design, CFD simulation and MEMS chip design Cadence	chandrasekharamma25@gmail.com
Aman Devangan	Aeronautical engineering	Entrepreneurship	Freelancer drone pilot	Drone development, flying skill	Mission Planning, Lichi app, dronedeploy, Pix4D , WebODM,	GIS softwares for aerial data processing	dewangan.aman01@gmail.com
Jeejy Theophilus J	M Tech Aeronautical (UAV)	R&D	Tractor And Farm Equipment's (TAFE)	UAV Functions, Systems knowledge, Algorithm role understanding on hardware's, troubleshooting and Leadership & management	PX4, MavProxy, ROS simulation software's, AutoCAD/CATIA, Ansys, Matlab, ArcGIS, Pix4D, OpenCV, MangoDB	OpenCV, MangoDB, PX4, Python lang, ROS, AutoCAD/CATIA, Ansys, Matlab.	jeejytheophilus@tafe.com
Vivek Jabaraj Joseph	PhD, Mechanical and Electro-Mechanical Engineering	Design	Research scholar, Tamkang University, Taiwan	Fluid mechanics, aircraft stability, avionics, MEMS, semiconductors	Solidworks, catia, ANSYS, COMSOL, Cadence, Autocad, arduino, matlab, python	Cad modeling, FEM simulation, avionics, semiconductor design, semiconductor fabrication, semiconductor testing	vivekjabarajwork@gmail.com
Rohith Reddy Thummalapally	Graduate student - Aeronautical Engineering	Higher Education	Master's student, Department of Material Science, National Cheng Kung University, Tainan,	Working knowledge of Calculus, Physics and Chemistry and also Computer modelling experience	VASP, VESTA, Materials Studio and Ansys		rohithreddythummalapally@gmail.com
BALASUBRAMANIYAN V	B.Tech - Aeronautical engineering	R&D	Graduate Engineer, Executive,UCAL TECHNOLOGIES (Aerospace and defence division of UCAL Fuel Systems	Design and Manufacturing	Advanced composite materials parts production with Autoclave machine.	Design and Structural analysis of composite materials for aerospace,	v.bala251099@gmail.com
Karthika	M.Tech UAV	Design	Assistant Manager	Softwares	3D printing	Advanced technology in 3D printing	karthika.spacenov1@gmail.com

Feedback Report on Industry Expert

Name	Qualification with specialisation	Choose any one below which can describe your job broadly	Designation, employer, work place	List the knowledge and skill set required for your current designation	List the specific tools/techniques using in your industry	List the skill set and tools required for meeting future trends in your domain	Email Address
Mohammed Azharuddin	B.E Aeronautical, Health safety and environment	Maritime and Logistics	HSSEQ Coordinator, MILAHA MARITIME & LOGISTICS	Knowledge on Legal requirements and compliance of local country, Knowledge is Job safety Analysis, Knowledge to investigate Accidents, Ability to suggest safe work method, Ability to influence workforce, Knowledge on ISO 9001, ISO 45001 AND ISO 14001 AND SO ON.	Root cause Analysis - 5 why and fish bone analysis, Training matrix to track the training record of each and every individual	NEBOSH IGC, IOSH, ISO 45001 LEAD AUDITOR, ISO 14001 ENVIRONMENTAL AUDITOR	
Sivashankar	ME VLSI Design	R&D	CTO	Drones, Autopilot, Control System, Embedded Programming	Python, Open CV, SolidWorks, Matlab	Scripting, Design.	
Sathishkumar	Engineering, Cloud technology	Cloud computing	Technology Analyst	IOT	AWS/Azure	Devops tools	
Samrat Pradhan	M.Tech Avionics	Aviation	Airworthiness Officer, Civil Aviation Authority of Nepal, Kathmandu, Nepal	Aviation knowledge, Civil Aviation Requirements, Aircraft Type Training	Compliance monitoring by audit, surveillance, etc	Safety Management System(ICAO Annex 19)	
Karthick R	B.E Aeronautical engineering	Quality assurance	Application Tester	Java,SQL, MS office	Selenium, Cucumber framework	Cucumber framework, Soap UI	
Tamilarasan P	BE AERONAUTICAL	Aviation	Manufacturing Lead and UAv Pilot	CATIA V5 , Composite manufacturing UAV Piloting Autopiloting Integrating	CATIA		
Anbarasan Annadurai	Msc Aeronautical specialized in Aircarft system Engineering and Design	Higher Education	Student	Product development and design	Matalab,Modefrontie,Catiav5, Ansys.C,C++,Java,Star CCM	Star CCM	
SASITHARAN A	B.Tech , Aerospace	Management	Drone Operation Manager	UAV , Design , Maths , Communication , Avionics , Basic Programming (Ex: Arduino , etc,.), UAS Piloting.	CAD , CAE , Mission Planner , DJI Tools	Innovative Thinking , Artificial Intelligence , Machine Learning	
Linganandam	Master in avionics	Automobile	Robert bosch, bangalore	Analtical and programming skills	All CAN Related tools	Machine learning and artificial intelligence	
Kothandaraman K	B.E.Aeronautical Engineering	R&D	Design Engineer	1.Cad software:actually,NX 2.design calculations. 3.GD&T 4.Stock Up 5.DFMEA	Catia UG-NX	Advanced materials, Strength of materials.	
T,MATHEVAN PILLAI	M.E. Thermal Power Engineering	Manufacturing	Dy.General Manager,NLC INDIA Ltd,Neyveli and Barsingsar(Rajastan)	Experience,Hard work,Involvement,	Training ,Planning, Decision making,completing the work as per schedule	Planning, Execution decision making and Experience	mathevanpillai.t57@gn
Manivel Mohanasundaram	M.E. - Aeronautical Engineering	Design	HVAC Engineer - EATON @ Singapore	HVAC System Design Standards	AUTOCAD, REVIT, SOLIDWORKS & ANSYS WORKBENCH	Course modules for Composite Structures, Thermal & Electrical insulation materials.	manivel02@gmail.com
Gopinathan	BE aeronautical engineering	Manufacturing	Production Manager, Dileka Aerospace, Trichy	Engineering drawing, composite materials, Structures, Advanced Engineering tools, Design analysis	Designing softwares, Analysing softwares, NDT	NDT, Basic engineering, Structure based knowledge	dilekaaerospace@gma

Anand Janakiraman	B.E.Aeronautical	Technical Publications	Team Lead, Engineering Data Author, Boeing India PVT LTD, Chennai	Engineering Graphics, Analytics, Aerodynamics, Aircraft Design, Engineering Reading, Basics of Aircraft	Catia, Enovia, Proge Cad	Aerospace Knowledge, Design, Technical Documentation, Engineering Problem Solving, Customer support on various aviation areas.	anandaero002@gmail.
Javagar	B.E aeronatical	Aviation	Senior engineer,alten india, Bangalore	Aircraft maintenance, basic electrical, engineering graphics, aircraft charecterstics, quality management, aircraft engines, fly by wire related complete knowledge.	Microsoft word and excel, Adobe acrobat, lean methodology, PDCA cycle.	Project management and technical writing tools	javagar777@gmail.co m
Renukadevi	BE	R&D	CAE Engineer	Strengthbof materials, design	Hypermesh,Cadd,catia	Simulation,simlab,3D design softwares	renuaero@gmail.com
Duraipandian	MBA	Quality assurance	BOOKS AND	COMPUTER KNOWLEDGE	TUT FILE	Automation of pdf	duraipandian.biochem.
Renukadevi	BE	R&D	FEMLOGIC	Strength of materials	Hypermesh, Cadd, catia	SIMLAB, FUSION	renuaero@gmail.com
Mariappan lakshmanan	engineering	Manufacturing	technology services	Mechanical engineering	Creo, solid works	works,Lean,6sigmaManufacturing	m
Senthilkumar	DESIGN	R&D	ENGINEER	FEA,SOM	ABAQUS,ANSA		rmsenthilkumar01@gn
Lakshmanan Palanimuthu	PhD in Composite Materials	Design		Linear/Nonlinear Finite Element	AUTOFORM, StarCCM,	Intelligence, First Principle and	m
Mohanasundaram	B.E (Mechanical)	R&D	Suzuki India limited,	and development,	UG NX, NACCS,	CATIA, UGNX,	mohanasund5191@gr
Dinesh	Enginnering	Design	India Pvt Ltd	plastic, metal parts with CAD	CATIA, UG NX	CATIA, UG NX	jagannathandinesh@g
Mukundhan Selvam	(Aerospace engineering)	R&D	scientist, MSC	Cuda, Python, FEA, HPC	engineering	High Performance Computing	mukunthhgr8@gmail.c
Akbaf Gaffoor	B.E Aero	Manufacturing	Arrival Automotive	Manufacturing, Tolerance stack	Polyworks	applications, Material science,	m
Ravi	engineering	Quality assurance	MOTHERSON	Material science	Fish bone, pareto	Six sigma	m
Selvaganapathy Nagarajan	BE Aeronautics	Manufacturing	technician	codes,able to write manual	programming		ganapathy013@gmail.
R Dhisondhar	M.Tech Design Engineering	Design	Engineer, Ansys	CAE skills	Ansys, Python	Python	om
Deepak	Me in Aerospace Technology	Information technology	IT Analyst, TCS, Kochi	Programming in c#, Selenium	Visual studio, Selenium, Appium, Xamarin uitest	Any programming language, open source test automation tools	deepakkg88@gmail.c om
PL RajaRao	Engineering	R&D	Wind Systems,	Heat Transfer, Project Planning,	XFoil, RFoil,	Agile Methods	rajarao.pl@gmail.com
Abdul Rauf	M.E Aeronautical engineer- Composites/Stress analysis/Fatigue	R&D	Tech lead, Chennai	Composite design and calculation	Ansys, Patran, Nastran, Hypermesh, Abaqus, Creo, Catia	Learn the subjects with applications. Eg: we should think and study where this subject will be useful in industry/product. Another eg: Aerodynamics useful for designing outer shapes(use cfd with validation not just colour plots)/Aerostructures for inner strength (use with validation not just colour plots). Sample project to explore this understanding should be taken during semester holidays.	abdulraufaero@gmail.
Gokul	M.S Quality management	Quality assurance	SDSC SHAR,ISRO	making skills	predictable analysis	Industry 4.0,3D technology	m
Sivaraj Sivakumaran	M.E Aerospace Technology	R&D	"SE", ISRO, URSC	Determination, Trajectory Design	tools		siva.prop@gmail.com
Ravichandran	BE Aeronautical	Design	Engineer, RNTBCI	Enovia , PLM &PDM	NX & CATIA	related experience and software	vravi.tdr@gmail.com
SEETHARAMAN	M.Tech in ECE	R&D	ISRO, Bangalore	defence technology, aero space	domain	printing, drone technology,	purushoth11atms@gm
Srinandh S	Engineering	Design	Product Engineer	Materials & Manufacturing	one design and Analysis	DFSS	

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Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Department of Aeronautical Engineering
Faculty Feedback on Curriculum

Name: Boopathy G
ID No.: TTS 1227
Designation: Assoc Prof.
D.o.J: 05/8/2008

S.No	Criteria	High	Medium	Low
	Content – CO – PO compliance	✓		
1	Course content is relevant to the course mapping	✓		
2	Course outcome contribution towards PO attainment	✓		
3	Course is relevant to the PSC	✓		
4	Course outcome levels are relevant to the course content	✓		
	Real world Problem solving		✓	
5	Course content demand usage of modern tools		✓	
6	Course content addresses current industry practice	✓		
7	Course content will serve for future industry practice		✓	
	Time management		✓	
8	Adequate time available to deliver content		✓	
9	Adequate time available to conduct Assessment		✓	
10	Students are attentive in class	✓		
	Innovation in TLP			
11	Provision to introduce new TLP method	✓		
12	Availability resources in internet	✓		
13	Availability of resources in local library	✓		
	Assessment			
14	All assessment questions are as per blooms taxonomy and CO level	✓		
15	Questions are relevant to CO	✓		
16	There is less / no deviation among internal and external question paper		✓	
	Curriculum Design			
17	BoS is taking care of Current and Relevance of the offering Programme	✓		
18	Employability skills are addressed in curriculum	✓		
19	Active participation in providing suggestions in curriculum design		✓	
20	Curriculum design methodology followed by department		✓	
21	The curriculum is updated regularly	✓		

Kindly provide suggestions to improve (Answers marked with Medium and low)

Industry visits helps students to gain practical knowledge; frequent arrangement of industrial visits needed.

Signature

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Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Department of Aeronautical Engineering

Students Feedback on Curriculum

Name: S.Sairam

ID No.: 9200

Year: 3rd year

Batch: 2017-21

S.No	Criteria	High	Medium	Low
	Curriculum Design			
1	BoS is taking care of Current and Relevance of the offering Programme		✓	
2	Employability skills are addressed in curriculum	✓		
3	Active participation in providing suggestions in curriculum design		✓	
4	Curriculum design methodology followed by department	✓		
	Frequency in Curriculum update			
5	The curriculum is updated regularly		✓	
6	Improvements in lab experiments		✓	
7	Improvements in Teaching – learning practice		✓	
	Suggestions and Improvements			
8	Students interest level in available courses (List topics to be modified / removed)	✓		
9	Time available for course preparation		✓	
10	Opportunity and motivation in Self Study		✓	
11	Availability of course reference materials (List non availability of reference materials)	✓		
	Kindly provide suggestions to improve (Answers marked with Medium and low)			
	We need more refernce books from libary.			

SIGNATURE

Aeronautical Engineering Curriculum - Insights

52 responses

Publish analytics

Name

52 responses

Renukadevi

Mohammed Azharuddin

Sivashankar

Sathishkumar

Samrat Pradhan

Karthick R

Tamilarasan P

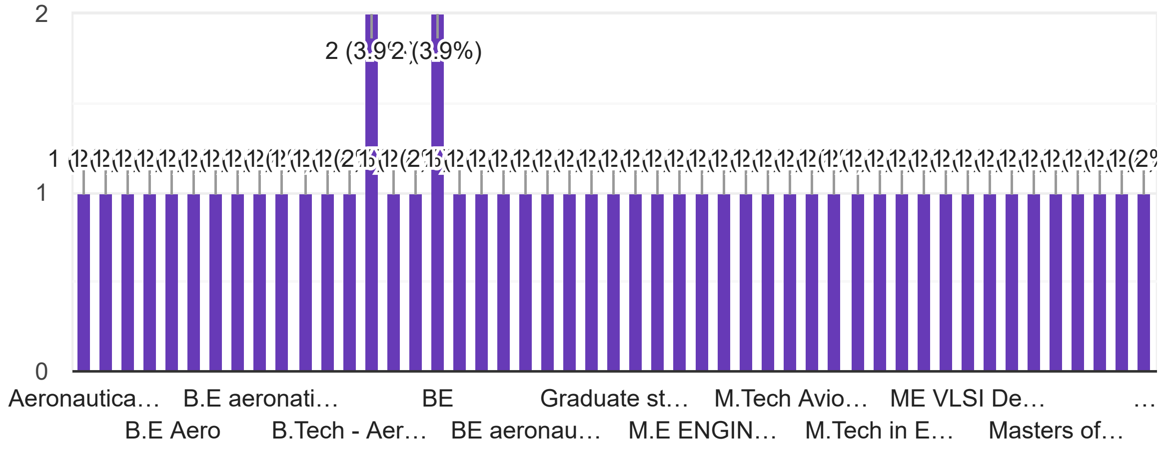
Anbarasan Annadurai

SASITHARAN A

Qualification with specialisation

Copy

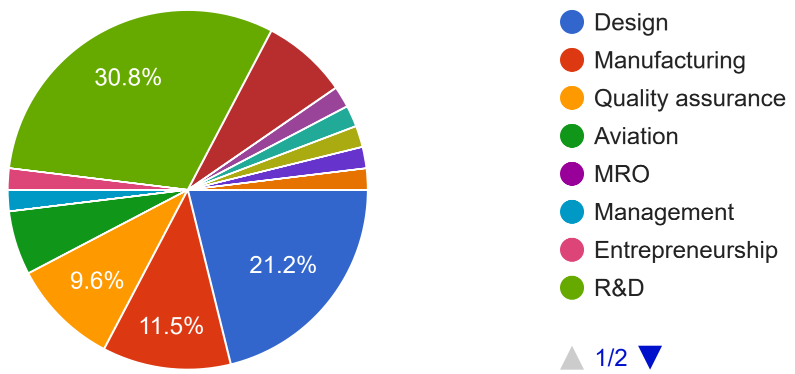
51 responses



Choose any one below which can describe your job broadly

Copy

52 responses



Designation, employer, work place

51 responses

HSSEQ Coordinator, MILAHA MARITIME & LOGISTICS

CTO

Technology Analyst

Airworthiness Officer, Civil Aviation Authority of Nepal, Kathmandu, Nepal

Application Tester

Manufacturing Lead and UAv Pilot

Student

Drone Operation Manager

Robert bosch, bangalore

List the knowledge and skill set required for your current designation

51 responses

Knowledge on Legal requirements and compliance of local country, Knowledge is Job safety Analysis, Knowledge to investigate Accidents, Ability to suggest safe work method, Ability to influence workforce, Knowledge on ISO 9001, ISO 45001 AND ISO 14001 AND SO ON.

Drones, Autopilot, Control System, Embedded Programming

IOT

Aviation knowledge, Civil Aviation Requirements, Aircraft Type Training

Java,SQL, MS office

CATIA V5 ,
Composite manufacturing
UAV Piloting
Autopiloting Integrating

List the specific tools/techniques using in your industry

50 responses

Root cause Analysis - 5 why and fish bone analysis, Training matrix to track the training record of each and every individual

Python, Open CV, SolidWorks, Matlab

AWS/Azure

Compliance monitoring by audit, surveillance, etc

Selenium, Cucumber framework

CATIA

Matalab,Modefrontie,Catiav5,Ansys.C,C++,Java,Star CCM

CAD , CAE , Mission Planner , DJI Tools

All CAN Related tools

List the skill set and tools required for meeting future trends in your domain

46 responses

Python

NEBOSH IGC, IOSH, ISO 45001 LEAD AUDITOR, ISO 14001 ENVIRONMENTAL AUDITOR

Scripting, Design.

Devops tools

Safety Management System(ICAO Annex 19)

Cucumber framework, Soap UI

Star CCM

Innovative Thinking , Artificial Intelligence , Machine Learning

Machine learning and artificial intelligence

VELTECH RANGARAJAN Dr.SAGUNTHALA R&D INSTIUTE OF SCIENCE AND TECHNOLOGY

School of Mechanical Engineering

Department of Aeronautical Engineering

Feedback Analysis Report (Curriculum Development)

AY: 2019-20

		A	D	Remarks for improvement
Curriculum Design		97.1	2.9	
Frequency in Curriculum update		98.7	1.3	
Improvents in TLP & leraning resources		97.1	2.9	
Content – CO – PO compliance in curicullum		100.0	0.0	
Real world Problem solving in curricullum		100.0	0.0	
oppurtunity for Innovation in TLPi		100.0	0.0	
Assessment quality as per OBE		100.0	0.0	
Open feedback salient points (Comments received)		Open feedback salient points (Suggestion for improvement)		
Alumni	Topics revision	Material science, UAV RC plane, Nano technology		
	TLP suggestions	Project based learning		
Industry / Academic Expert				
	Knowledge & skill required - present	Entrepreneurship, problem solving, team management, fund raising and events management, 1. NX CAD 2.design calculations, 3.GD&T, 4. Stock Up, 5. DFMEA		
	Current tools & techniques used	Open form, Mathlab, Excel, python,Scilab and Ansys		
	Futuristic skills set	Dratfish, Scilab, SimScale and Open form, designing Software knowledge plus material handling		

Action taken recommended:

- PBL based Courses need to be add
- Give awarness about TBI to students.
- Open Source Softwares can be included.
- UAV Specialization need to be strengthen.

Members

[SURENDAR. G]

(BOOPATHY G)

[E. GOPI]

HoD

VELTECH RANGARAJAN Dr.SAGUNTHALA R&D INSTIUTE OF SCIENCE AND TECHNOLOGY

School of Mechanical Engineering

Department of Aeronautical Engineering

Feedback Analysis Report (Curriculum Development)

AY: 2018-19

	Overall		
	A	D	Remarks for improvement
Curriculum Design	93.8	6.5	Awareness about BoS to be given to students
Frequency in Curriculum update	93.8	6.5	
Improves in TLP & learning resources	98.4	1.6	
Content – CO – PO compliance in curriculum	100.0	0.0	
Real world Problem solving in curriculum	100.0	0.0	
opportunity for Innovation in TLP	100.0	0.0	
Assessment quality as per OBE	100.0	0.0	

Open feedback salient points (Comments received)		Open feedback salient points (Suggestion for improvement)
Alumni	Topics revision	DGCA rules updated, Space navigation
	TLP suggestions	satisfied
Industry / Academic Expert		
	Knowledge & skill required - present	Drones, Autopilot, Control System, Embedded Programming , Composite manufacturing, Legal requirements and compliance, Analytical and programming skills, Aircraft Type Training
	Current tools & techniques used	CAD , CAE , Mission Planner , DJI Tools. Matalab,Modefrontie,Catiav5,Ansys.C,C++,Java, Star CCM, Compliance monitoring by audit, surveillance,
	Futuristic skills set	Innovative Thinking, Artificial Intelligence, Machine Learning, Advanced materials, Ratfish, Scilab, SimScale and Open form

Action taken recommended:

1. DGCA ammendments are updated in Aircraft Rules and Regulation.
2. Drone related Projects are given to Students.
3. Strengthen FMC Lab Infrastructure requirement need.
4. Next Revision - TLP based on Control system & Instrumentation in all domain.

Members

1. E. Gopi [E. GOPI]

2. [G. SURENDAR]

3. (Boopathy G)

4. [C. Kannan]

HoD

Vel Tech Dr RR SR University
School of Mechanical Engineering
Department of Aeronautical Engineering
Feedback Analysis Report (Curriculum Development)
AY: 2017-18

	Overall		
I Curriculum Design & Development	A	D	**Remarks for improvement**
1. Updating current topics in BoS	100	0	
2. Employability weightage in BoS	100	0	
3. Opportunity to express comments in Curriculum design	100	0	
4. Methodology of curriculum design	100	0	
5. Frequency of curriculum update	92	8	Awareness about BoS to be given to students
II Improvement required in curriculum			
1. Students interest in pursuing course	100	0	
2. Time management for course offering	81	19	Training for new faculty to be given
3. Motivation for self-study	100	0	
4. Learning resource availability	100	0	
5. Quality of lab experiments	94	6	
6. TLP practice improvement	100	0	

Open feedback salient points (Comments received)		**Open feedback salient points (Suggestion for improvement)**
Alumni	Topics revision	Industrial aerodynamics, UAV, wind engineering
	TLP suggestions	3D printer kind of usage in teaching
Industry / Academic Expert	Topics revision	Aircraft design, ILS & sensors
	New skills required	CAD s/w, Arduino program, strain gauge, SCILAB, open foam
	Value added courses	courses from EDX
	IV / Faculty visit	CDG, Capgemini
	TLP technique	hands on training, composite fabrication
	FDP for faculty	materials

Action taken recommended:

- Bos the methodology awareness added in orientation program.
- Industrial Aerodynamics, Unmanned Aerial vehicle and wind Engineering need to be improved,
- AEMR / composite fabrication and repair needs improvement.

Members **HoD**

(BOOPATHY G) G. Kannan

(G. SURENDAR)

E. Gopi [E. GOPI]

Vel Tech Dr RR SR University

School of Mechanical Engineering

Department of Aeronautical Engineering

Feedback Analysis Report (Curriculum Development)

AY: 2016-17

	Overall		Remarks for improvement
I Curriculum Design & Development	A	D	
1. Updating current topics in BoS	100	0	
2. Employability weightage in BoS	100	0	
3. Opportunity to express comments in Curriculum design	100	0	
4. Methodology of curriculum design	100	0	
5. Frequency of curriculum update	100	0	
II Improvement required in curriculum			
1. Students interest in pursuing course	25	75	Active learning methods to be introduced
2. Time management for course offering	63	38	smart classrooms can be introduced
3. Motivation for self-study	88	13	
4. Learning resource availability	100	0	
5. Quality of lab experiments	88	13	
6. TLP practice improvement	100	0	

Open feedback salient points (Comments received)		Open feedback salient points (Suggestion for improvement)
Alumni	Topics revision	smart structures, industry collaborated courses
	TLP suggestions	Practical teaching, cabin crew training, seminar mandatory
Industry / Academic Expert	Topics revision	GD&T, Space systems, UAV, Interdisciplinary courses
	New skills required	CFD, Control systems, navigation
	Value added courses	vehicle aerodynamics, structural monitoring, publications
	IV / Faculty visit	MRO industry, DRDO
	TLP technique	Video lectures
	FDP for faculty	industry visit for faculty

Action taken recommended: 1. Effective use of PPT need to be improved

2. Smart material course can be introduced
3. Inter disciplinary courses will be taken care by university electives
follow up of mentors for student awareness.
4. Identification of Industry One Credit course for potential fields

HoD

Members

(Boopathy G) (G.Kannan)

[E. GOPI] (G SURENDAR)

Vel Tech Dr RR SR University

School of Mechanical Engineering

Department of Aeronautical Engineering

Feedback Analysis Report (Curriculum Development)

AY: 2015-16

	Overall		
I Curriculum Design & Development	A	D	Remarks for improvement
1. Updating current topics in BoS	94	6	
2. Employability weightage in BoS	100	0	
3. Opportunity to express comments in Curriculum design	88	12	
4. Methodology of curriculum design	100	0	
5. Frequency of curriculum update	94	6	
II Improvement required in curriculum			
1. Students interest in pursuing course	67	33	Active learning methods to be introduced
2. Time management for course offering	100	0	
3. Motivation for self-study	100	0	
4. Learning resource availability	83	17	
5. Quality of lab experiments	50	50	Teaching methodology of lab experiments to be improved
6. TLP practice improvement	83	17	
Open feedback salient points (Comments received)			Open feedback salient points (Suggestion for improvement)

Alumni	Topics revision	CAD, Heat engines, Airworthiness related topics to be added
	TLP suggestions	Project based course need
Industry / Academic Expert	New topics needed / deleted	Data analysis, non-linear systems, Engine maintenance, FEM
	New skills required	data analysis s/w, ANSYS
	Value added courses	modelling and simulation
	IV / Faculty visit	Boeing, AIR India, CSIR
	TLP technique	smart class
	FDP for faculty	GIAN course

Action taken recommended:

1. Faculty competency on ALM shall improve.
2. To introduce design and Experiments in lab courses.
3. Infrastructure for smart class requirement shall be raised

HoD

Members

G. SURENDAR —

G. Kannan —

Boopathy G —

11

Veltech Dr.RR & Dr.SR University
(Estd. u/s 3 of UGC Act, 1956)

ALUMNI FEEDBACK ON CBCS CURRICULUM

1. Name : VIGNESH.S.M
2. VT / VtU No. : 3026
3. Batch : 2012-2016
4. Branch : Aeronautical
5. Contact No : 8939761650
6. Email ID : emailsmvignesh@gmail.com

The curricula of all the B.Tech programs of our university are developed from the Washington Accord Graduate attributes that clearly describe the expected qualities in terms of Engineering Knowledge and Skills, and attitude to be demonstrated by the students during exit of the programme.

To promote flexibility in student learning and interdisciplinary education, our university adopted Choice Based Credit System (CBCS) in the academic year 2015-16. The CBCS provides full flexibility for students to learn wide variety of courses such as Programme Core, Programme Electives and Value added courses. The students have six degree choices in choosing the courses. (i) Faculty choice, (ii) Course choice within the program, (iii) Courses from other program/departments, (iv) Courses from international universities (v) Semester Choice and (vi) Courses from online courseware of internationally reputed universities such as Massachusetts Institute of Technology (MIT), USA, Harvard University, Berkeley University of California, The University of Texas System, Australian National University, The University of Queensland etc . This CBCS allows the students to prepare various career options such as employment in engineering industries, IT industries, higher education in reputed institutions and career in research organizations.

We request you to go through our curriculum which is available in our university website and give your valuable suggestions to enrich the curriculum further.

1. Are any new course(s)/subjects to be introduced in our curriculum? If yes, please mention the title of the course(s) and if possible, give outline of the course(s)/subjects. ✓

- Industrial Aerodynamics
- Autonomatic Aerial vehicle

2. Are any specific/new/advanced topics to be included to or removed from any of the course(s)/subjects. If yes, please mention the topics to be included / removed against each course(s)/subjects as given in the following table.

Title of course(s)/subjects	Topics to be included	Topics to be removed
Aerodynamics	Wind Engineering & Building Aerodynamics	Theoritical Aerodynamics

3. If you have identified any specific skills, required for graduates of our branch / department, to be imparted through the curriculum, please list them.

- SCILAB & OPENFORM Software

4. May we request you to suggest some of the value added courses; professional certification for those, industries will give preference during recruitment of freshers?

- Industrial Thinking

5. Specify some industries, Research centers, R & D labs and reputed institutions either in India or Abroad for our faculty to visit & observe best practices.

~~NATIO~~ NATIONAL INSTITUTE OF WIND ENERGY [NIWE]

6. Could you suggest some of innovative instructional (teaching) techniques to enhance students learning?

- 3D Presentation & Access to online Course

7. Could you mention professional certification, training programs to improve our faculty competency?

- OPENFORM, LATEX & SCILAB Software

Signature [signature]

Organisation: EPOCH AEROSPACE

Designation: OPERATIONAL HEAD SOUTH ZONE

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Department of Aeronautical Engineering
Faculty Feedback on Curriculum

Name: Boopathy G
ID No.: TTS 1227
Designation: Assoc Prof.
D.o.J: 05/8/2008

S.No	Criteria	High	Medium	Low
	Content – CO – PO compliance	✓		
1	Course content is relevant to the course mapping	✓		
2	Course outcome contribution towards PO attainment	✓		
3	Course is relevant to the PSC	✓		
4	Course outcome levels are relevant to the course content	✓		
	Real world Problem solving		✓	
5	Course content demand usage of modern tools		✓	
6	Course content addresses current industry practice	✓		
7	Course content will serve for future industry practice		✓	
	Time management		✓	
8	Adequate time available to deliver content		✓	
9	Adequate time available to conduct Assessment		✓	
10	Students are attentive in class	✓		
	Innovation in TLP			
11	Provision to introduce new TLP method	✓		
12	Availability resources in internet	✓		
13	Availability of resources in local library	✓		
	Assessment			
14	All assessment questions are as per blooms taxonomy and CO level	✓		
15	Questions are relevant to CO	✓		
16	There is less / no deviation among internal and external question paper		✓	
	Curriculum Design			
17	BoS is taking care of Current and Relevance of the offering Programme	✓		
18	Employability skills are addressed in curriculum	✓		
19	Active participation in providing suggestions in curriculum design		✓	
20	Curriculum design methodology followed by department		✓	
21	The curriculum is updated regularly	✓		

Kindly provide suggestions to improve (Answers marked with Medium and low)

Industry visits helps students to gain practical knowledge; frequent arrangement of industrial visits needed.

Signature

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

FEEDBACK ON CURRICULUM

1. Name : Ashok Kumar Varadarajan
2. Position : Non US person contractor
3. Organization : UTC Aerospace Systems
4. Contact No : 8884120222
5. Email ID : ashokkumarVp.6@yahoo.co.in

The curricula of all the B.Tech programs of our university are developed from the Washington Accord Graduate attributes that clearly describe the expected qualities in terms of Engineering Knowledge and Skills, and attitude to be demonstrated by the students during exit of the programme. Now we are in the process of updating our curriculum and Syllabus as well as we are preparing ourselves for adapting CBCS system.

The CBCS provides full flexibility for students to learn wide variety of courses such as Programme Core, Programme Electives and Value added courses. The students have six degree choices in choosing the courses. (i) Faculty choice, (ii) Course choice within the program, (iii) Courses from other program/departments, (iv) Courses from international universities (v) Semester Choice and (vi) Courses from online courseware of internationally reputed universities such as Massachusetts Institute of Technology (MIT), USA, Harvard University, Berkeley University of California, The University of Texas System, Australian National University, The University of Queensland etc . This CBCS allows the students to prepare various career options such as employment in engineering industries, IT industries, higher education in reputed institutions and career in research organizations.

We request you to go through our curriculum which is attached as annexure I and give your valuable suggestions to enrich the curriculum further.

1. Are any specific/new/advanced topics to be included to or removed from any of the course(s)/subjects. If yes, please mention the topics to be included / removed against each course(s)/subjects as given in the following table.

Title of course(s)/subjects	Topics to be included	Topics to be removed
Aircraft component design	Designing	
Aircraft systems	ILS	

2. If you have identified any specific skills, required for graduates of our branch / department, to be imparted through the curriculum, please list them.

   CATIA, Solid Works

3. May we request you to suggest some of the value-added courses; professional certification for those, industries will give preference during recruitment of freshers?

   EDX

4. Specify some industries, Research centers, R & D labs and reputed institutions either in India or Abroad for our faculty to visit & observe best practices.

   Capgemini, CDG

5. Could you suggest some of innovative instructional (teaching) techniques to enhance students learning?

   Hands on training through laptop

6. Could you mention professional certification, training programs to improve our faculty competency?

Any other Comments:

Signature

artment,

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

FEEDBACK ON CURRICULUM

1. Name : Balaji K
2. Position : Design Engineer
3. Organization : HCL CAD Systems
4. Contact No : 9952344504
5. Email ID : Balajik.k6@gmail.com

The curricula of all the B.Tech programs of our university are developed from the Washington Accord Graduate attributes that clearly describe the expected qualities in terms of Engineering Knowledge and Skills, and attitude to be demonstrated by the students during exit of the programme. Now we are in the process of updating our curriculum and Syllabus as well as we are preparing ourselves for adapting CBCS system.

The CBCS provides full flexibility for students to learn wide variety of courses such as Programme Core, Programme Electives and Value added courses. The students have six degree choices in choosing the courses. (i) Faculty choice, (ii) Course choice within the program, (iii) Courses from other program/departments, (iv) Courses from international universities (v) Semester Choice and (vi) Courses from online courseware of internationally reputed universities such as Massachusetts Institute of Technology (MIT), USA, Harvard University, Berkeley University of California, The University of Texas System, Australian National University, The University of Queensland etc . This CBCS allows the students to prepare various career options such as employment in engineering industries, IT industries, higher education in reputed institutions and career in research organizations.

We request you to go through our curriculum which is attached as annexure I and give your valuable suggestions to enrich the curriculum further.

1. Are any specific/new/advanced topics to be included to or removed from any of the course(s)/subjects. If yes, please mention the topics to be included / removed against each course(s)/subjects as given in the following table.

Title of course(s)/subjects	Topics to be included	Topics to be removed
Strain guage, smart materials	Transducer,	

Materials Science	Fatigue, creep, smart materials and alloys.	

2. If you have identified any specific skills, required for graduates of our branch / department, to be imparted through the curriculum, please list them.
Strain guage design, Arduino programming

3. May we request you to suggest some of the value added courses; professional certification for those, industries will give preference during recruitment of freshers?
Material science

4. Specify some industries, Research centers, R & D labs and reputed institutions either in India or Abroad for our faculty to visit & observe best practices.
NAL, HAL

5. Could you suggest some of innovative instructional (teaching) techniques to enhance students learning?
Composite fabrication.

6. Could you mention professional certification, training programs to improve our faculty competency?
Advancements in materials and structures.

Any other Comments:

Signature

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Department of Aeronautical Engineering

Students Feedback on Curriculum

Name: S. Sairam

ID No.: 9200

Year: 3rd year

Batch: 2017-21

S.No	Criteria	High	Medium	Low
	Curriculum Design			
1	BoS is taking care of Current and Relevance of the offering Programme		✓	
2	Employability skills are addressed in curriculum	✓		
3	Active participation in providing suggestions in curriculum design		✓	
4	Curriculum design methodology followed by department	✓		
	Frequency in Curriculum update			
5	The curriculum is updated regularly		✓	
6	Improvements in lab experiments		✓	
7	Improvements in Teaching – learning practice		✓	
	Suggestions and Improvements			
8	Students interest level in available courses (List topics to be modified / removed)	✓		
9	Time available for course preparation		✓	
10	Opportunity and motivation in Self Study		✓	
11	Availability of course reference materials (List non availability of reference materials)	✓		
	Kindly provide suggestions to improve (Answers marked with Medium and low) We need more refernce books from libary.			

SIGNATURE