



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with 'A' grade by NAAC
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600 119.

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SCHOOL OF MECHANICAL OF ENGINEERING

Department of Aeronautical Engineering

Value-Added Courses Conducted During the Academic Year 2018-2019

Space And Digitisation - Changing Paradigms And Challenges

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JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI – 600119
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**SPACE AND DIGITISATION-CHANGING
PARADIGMS AND CHALLENGES**

ORGANIZED BY SATHYABAMA INSTITUTE OF SCIENCE AND
TECHNOLOGY DEPARTMENT OF AERONAUTICAL ENGINEERING

CHIEF PATRONS
Dr. Mariazeena Johnson
President
Dr. Marie Johnson
President

MODULE 1: DIGITAL TRANSFORMATION IN SPACE INDUSTRY
MODULE 2: GLOBAL NAVIGATION SATELLITE SYSTEMS (GNSS)
FOR EFFICIENT AND FLEXIBLE
MODULE 3: DIGITISATION IN EARTH OBSERVATION

27.08.2018 – 29.09.2018

COORDINATORS
Mr. P. Gunasekar
Prof, Aero
Mr.R. Gokulnath
Prof, Aero

CONVENORS
Dr.P. Boomadevi
HOD, Aero
Dr. A. Anderson
Prof, Aero

Course Layout

Week	Time	Topic
Week 1	6 hrs	Digital Transformation in the Space Industry.
Week 2	6 hrs	Navigation Satellite Systems (GNSS) for efficient and flexible air navigation.
Week 3	6 hrs	Classical and Performance-Based Navigation
Week 4	6 hrs	Digitization in Earth Observation.
Week 5	6 hrs	Data Archives & Access and Processing Services

Week 1 : Digital Transformation in the Space Industry

The digital revolution has an impact on many levels of space business and space technology. The advent of "New Space" is strongly connected to digitalization, a game changer challenging long standing paradigms such as in spacecraft mission and system design. This module illustrates the innovative effects of digitalisation in various areas such as earth observation, downstream services and mission and system design. The module also examines digitalization challenges in the space sector including



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cyber threats and the sector's increasing strategic and commercial value

Week 2 : Global Navigation Satellite Systems (GNSS) for efficient and flexible air navigation

Civil aviation is a multi-trillion-dollar market projected to grow continuously until at least 2040. Aircraft navigation and guidance from terminal to terminal is the determining cost factor for individual flights. Thus any savings resulting from the introduction of new digital technology will yield an extremely high return on investment due to economies of scale. This course outlines the specific navigation context before identifying where conventional navigation means (flight routes) are insufficient for achieving further increases in capacity, flexibility and performance.

Week 3 : Classical and Performance-Based Navigation

The concept of performance-based navigation (PBN) is outlined and why positioning needs to be available everywhere (area navigation - RNAV). The GNSS basic positioning principle is described and the relatively frequent satellite failures and anomalies are explored which are the reason why stand-alone GNSS cannot be used directly for a safety-critical application. The concept of solution separation statistics combined with the use of multiple GNSS constellations is introduced (Advanced Receiver Autonomous Integrity Monitoring – ARAIM) which in the long term may replace conventional navigation technology. The lecture concludes with a look at limiting factors, the current planning of civil aviation authorities and the European GNSS Galileo project

Week 4 : Digitisation in Earth Observation

This online course is about the advances made in Earth Observation (EO) over the last few years. No other area of space applications has seen so much advancement in recent decades. The objective of this course is to explore the major trends in the collection, storage, distribution and analysis of remote sensing data. The complementary data sources introduced in the course include satellites, high-altitude platforms (HAPSs), planes and unmanned aerial vehicles (UAVs). The European Copernicus System is the world's largest free and open monitoring system for environmental and security purposes.

Week 5 : Data Archives & Access and Processing Services

It is cited throughout the course as an example of the technological cutting edge, presented together with a commercial case study. Cloud-based access, archiving and processing technologies are introduced and discussed and basic terminology like DaaS, SaaS and PaaS is explained in the specific context of EO. The advent of Artificial Intelligence represents the dawn of a new era in data analysis. AI4EO provides additional analysis tools beyond physical algorithms. AI makes it possible to work on



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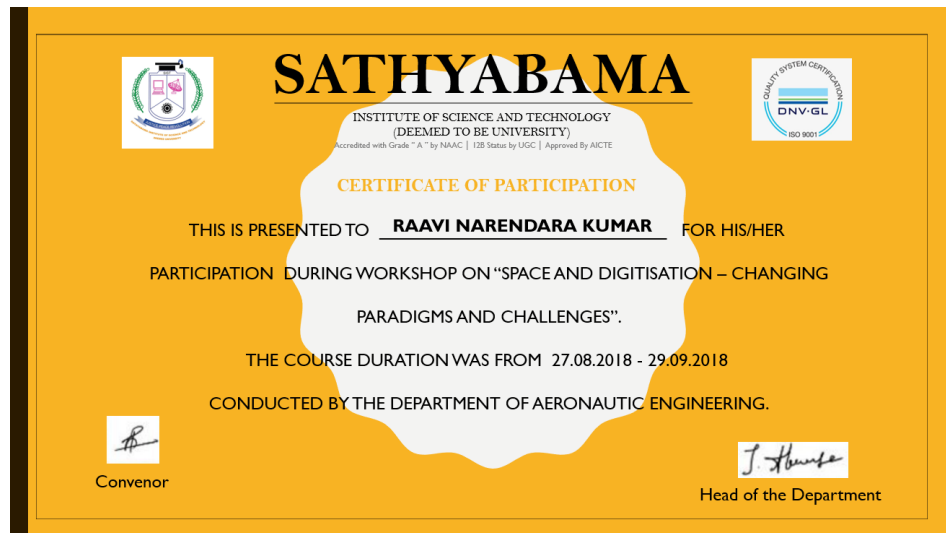
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extremely big data volumes and combine very different data types such as images and social media data.



List of Participants

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1	15SAE501	Aakash. S. S
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3	15SAE101	Ajin Deepak. R. M
4	15SAE503	Amit Gangwar
5	15SAE801	Arshia
6	15SAE504	Arunachalam .T
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10	15SAE104	Dipshee Dutta
11	15SAE113	Fayaz Khan.P
12	15SAE117	Imadambathuni Venkata Satyanarayana
13	15SAE106	Indukuri Phanindra Varma
14	15SAE107	Ishita Tyagi

15	15SAE505	John Anskar Fernando
16	15SAE108	Kadagala Anudeep
17	15SAE507	Kalaiselvan .S
18	15SAE901	Kamireddy Revanth
19	15SAE951	Kannadasan .S
20	15SAE120	Kathiravan. V. S
21	15SAE109	Madhana Surya. D. A
22	15SAE110	Mangireddi Akhil
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24	15SAE508	Mohanraj. A
25	15SAE111	Naresh Kumar Nagesvaran
26	15SAE118	Panchakarla Ramya
27	15SAE509	Parthiban. C
28	15SAE114	Raavi Narendra Kumar
29	15SAE952	Ranjith Kumar .S
30	15SAE510	Reju. J



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MODERN TOOLS FOR COMPUTATION FLUID DYNAMICS

The poster features a central image of a jet aircraft with a colorful aerodynamic flow visualization. The text is arranged around this central image. At the top, the Sathyabama University logo and name are present, along with the motto 'LEARN TODAY - LEAD TOMORROW'. The main title 'WORKSHOP FOR MODERN TOOLS FOR COMPUTATION FLUID DYNAMICS' is prominently displayed in large, bold, orange letters. Below the title, the dates '09.07.2018 - 13.08.2018' are shown. The organizing department, 'DEPARTMENT OF AERONAUTICAL ENGINEERING', is listed at the bottom. On the left, a dark blue circle contains the names of the coordinators and convenors. On the right, a dark blue triangle contains the names of the chief patrons.

COORDINATORS
Dr. A. Anderson
prof, Aero
Mr. S. Manigandan
Prof, Aero

CONVENORS
Mr. Alexander
HOD, Aero
Dr. P. Gunasekar
Prof, Aero

**WORKSHOP FOR
MODERN TOOLS FOR
COMPUTATION FLUID
DYNAMICS**

09.07.2018 - 13.08.2018

**DEPARTMENT OF
AERONAUTICAL ENGINEERING**

CHIEF PATRONS
Dr. Mariazeena Johnson
President
Dr. Marie Johnson
President

Course Description

Computational Fluid Dynamics (CFD), is a simulation tool used for analyzing complex thermal and fluid phenomena. It is instrumental in maintaining the quality and safety of many products we use on a day-to-day basis, such as an automobile or even the house we live in. CFD software is indispensable for "Front-loading" product development to ensure the best product concepts are identified early in the design process. Design quality will be improved during the conceptual design phase by conducting basic studies of fluid and thermal phenomena that directly affect product performance. Visualizing the complicated movements of a gas or liquid flow can be quite convoluted. By implementing simulation software, Cradle CFD, into the workflow, analyzing these movements is easier than ever. It enables the user to predict the performance of their products before physical testing. This results in a more optimized design early in the product development cycle. In some cases, simulation can even replace the need for physical testing, altogether. Utilizing Cradle CFD will provide engineers with the understanding of these type of movements and an easy-to-use tool that anyone could implement. Cradle CFD strength lies in its coupling capacity with other simulations tools, such as mechanical and structural software. The reinforced co-simulation capability with MSC Software products, such as Marc, Nastran, Adams, and Actran, it is possible to represent more accurate, realistic phenomena in



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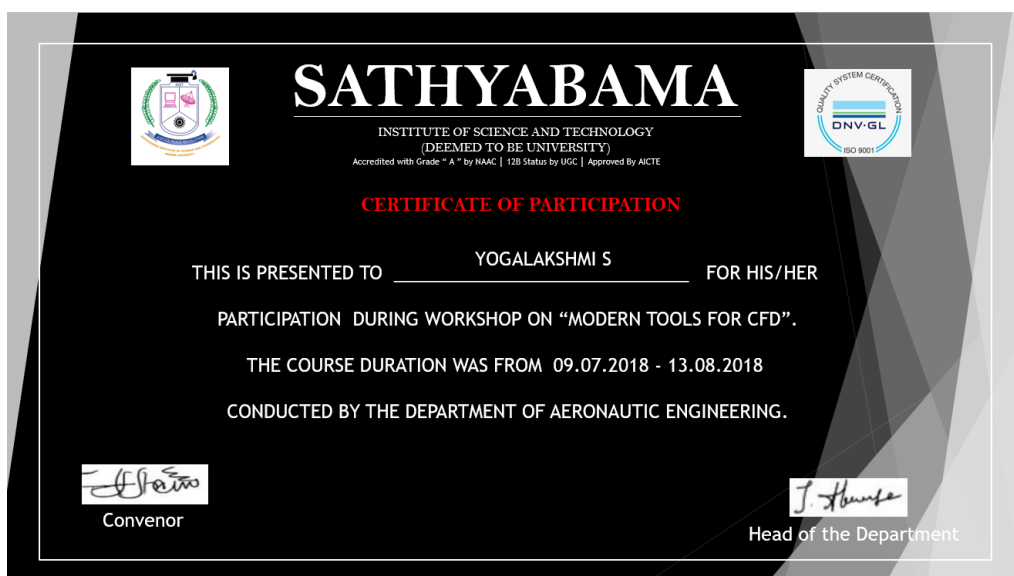
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simulations, allowing users to take more pragmatic approach for assessing design performance and potential risks

Modules

Module No.	Modules	Duration
1	3D CAD data import	2 Hrs
2	Density-based solver	2 Hrs
3	Pressure-based solver	2 Hrs
4	Radiation	2 Hrs
5	Discontinuous mesh	2 Hrs
6	Overset mesh	2 Hrs
7	Moving object	3 Hrs
8	6-degree-of-freedom motion	3 Hrs
9	Free surface	2 Hrs
10	Boiling and condensation	3 Hrs
11	Solidification and melting	2 Hrs
12	Humidity and dew condensation	2 Hrs
13	Cavitation	2 Hrs
14	Discrete Element Method	3 Hrs
15	Wiring pattern import	2 Hrs
16	Particle tracking	2 Hrs
17	Climate data referral	2 Hrs
18	Thermoregulation model	2 Hrs
19	Heat stress and ventilation evaluation	3 Hrs
20	Mapping	2 Hrs





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Advances in Aerospace Materials

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ADVANCES IN AEROSPACE MATERIALS

ORGANIZED BY SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY BY DEPARTMENT OF AERONAUTICAL ENGINEERING
04.02.2019 - 08.03.2019

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Dr. Mariazeena Johnson
Chancellor
Dr. Marie Johnson
Vice chancellor

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Prof, Aero
Mr.R. Gokulnath
Prof, Aero

CONVENORS
Dr. P. Boomadevi
HOD, Aero
Dr. A. Anderson
Prof, Aero

Modules

Week	Time	Topic
Week 1	6hrs	Classification of aerospace materials.
Week 2	6 hrs	Aluminum and aluminum alloys
Week 3	6 hrs	Titanium and titanium alloys.
Week 4	6 hrs	High strength steels.
Week 5	6 hrs	Powder materials

Week 1 Module 1. Classification of aerospace materials

This module will introduce you to the classification of aerospace materials. You will learn about the requirements for these materials. Technologies always affect the structure and properties of materials. You will learn about the main forming technologies (metal forming, hot and cold working, and machining) and their effects on the structure of aerospace materials. Phenomena that accompany the machining operations will be examined as well.

Week 2 Module 2. Aluminum and aluminum alloys

This module will introduce you to aluminum alloys, which are crucial aerospace materials. Aluminum alloys were the first to be used in the manufacture of aircraft. The use of aluminum revolutionized the aircraft industry. Its advantages are high manufacturability and specific strength (the ratio of maximum stresses to weight). We will study various classifications and designations of aluminum alloys as well as the basics of heat treatment. We will learn how



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alloying elements affect the structure and properties of aluminum alloys.

Week 3 Module 3. Titanium And Titanium Alloys

We will learn about the role of titanium in the aircraft industry, its advantages and disadvantages for aerospace applications, the structure and properties of titanium alloys. We will examine promising titanium aluminides and shape-memory titanium alloys. Titanium alloys have unique properties and are very promising as aerospace materials. Titanium alloys are used in heavily loaded airframe sections, undercarriage parts, skins to high Mach speed aircraft, jet engines, and many other aircraft components requiring high strength, fracture toughness and resistance to fatigue, creep and corrosion. These mechanical properties are superior to lightweight structural materials, including aluminum alloys and magnesium alloys.

Week 4 Module 4. High strength steels

This module will introduce you to high strength steels. Steel is used as an aerospace material, but to a lesser extent than titanium, aluminum, and composites. High strength steel cannot be replaced with other materials. Advantages of using steel in highly-loaded aircraft structures include high stiffness, strength, fatigue resistance and fracture toughness. In this part of the video course, we will deal with steels used in landing gear and other high-strength components, namely: maraging steels, medium-carbon low-alloy steels, and stainless steels.

Week 5 Module 5. Powder materials

This module will introduce you to powder metal materials and modern technologies used to manufacture them. Powders are used in the manufacture of complex parts or when increased heat resistance is required. "Sweating" highly porous materials are used to prevent icing on aircraft. Metal powder compositions are of particular interest due to the rapid development of additive technologies. You will learn about the requirements for powders used in additive manufacturing.



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25	16SAE018	Pothureddy Holy Sophia
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35	16SAE024	Syed Khaja Nizamuddin
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39	16SAE951	Venkatraman. N
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