भारत सरकार
अंतरिक्ष विभाग

सत्यमेव जयते

Government of India
Department of Space

INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY

(Declared as Deemed to be University under Section 3 of the UGC Act, 1956)

Valiamala. P. O., Thiruvananthapuram 695 547, Kerala







A Glimpse of Academics & Research Programme @ IIST

Our Core Strength (2015)

B.Tech. Students	561
M.Tech. Students	177
Ph.D Students	101
Faculty	93

Placement Office:

Contact No: 0471-2568606
email ID: placement@iist.ac.in

Placement Officers:

Dr. Deepak Mishra
Associate Professor
Dept. of Avionics
Contact No. 0471-2568424

Dr. Bijudas C. R
Assistant Professor
Dept. of Aerospace Engineering
Contact No. 0471-2568450

Indian Institute of Space Science and Technology

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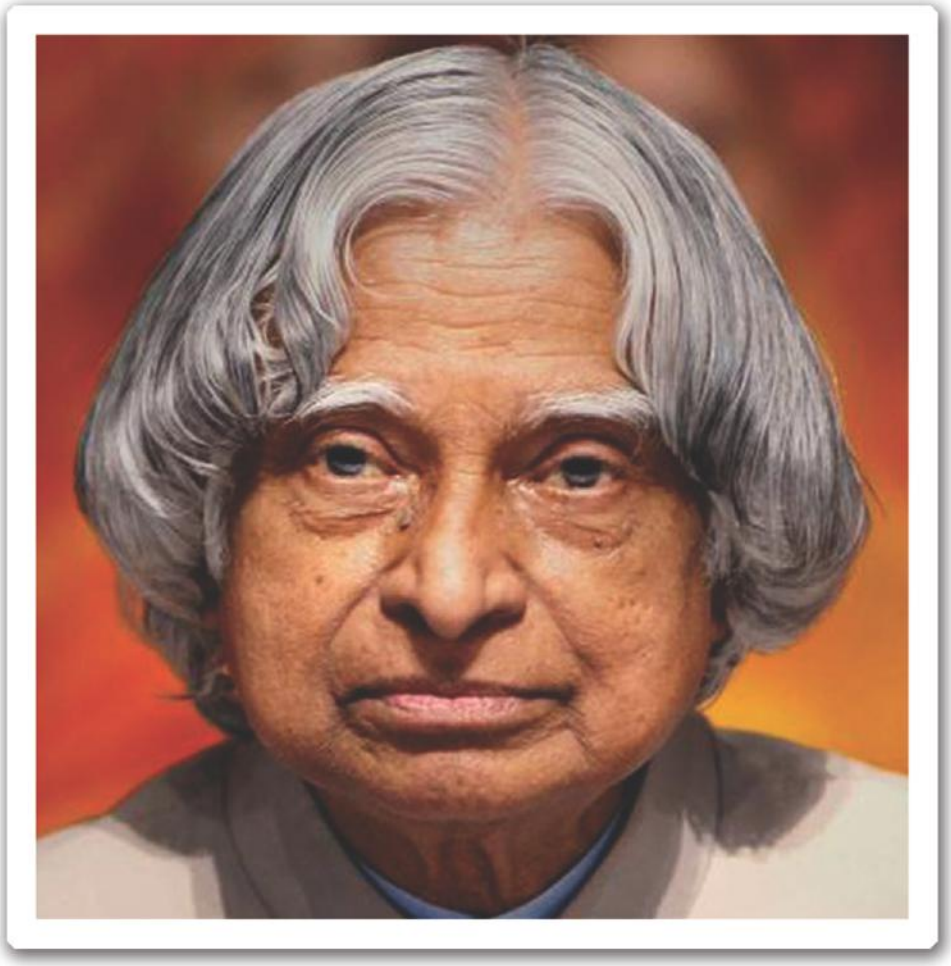
www.iist.ac.in

Our Inspiration

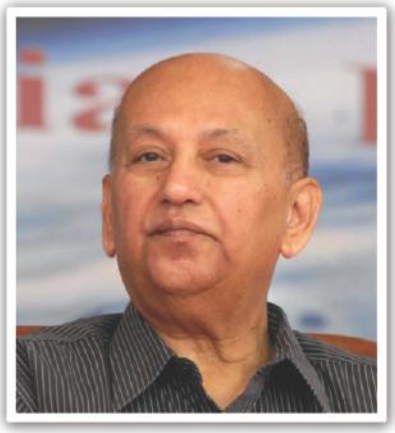


Dr. (Late.) A. P. J. Abdul Kalam

Our First Chancellor

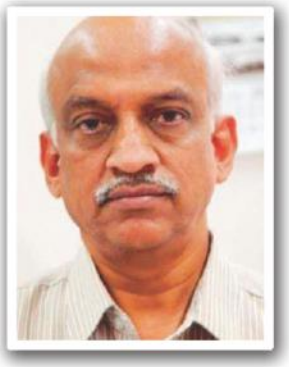
Our Guidance and Support

Dr. U. R. Rao



Our Chancellor

Shri. A. S. Kiran Kumar



President, Governing Board
Chairman, Governing Council
Secretary, DoS /Chairman, ISRO

Dr. V. K. Dadhwal

Director IIST,
Chairman, Board of Management, IIST

VISION

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

MISSION

Create a unique learning environment enriched by the challenges of the Space Programme.
Nurture the spirit of innovation and creativity.
Establish Centers of Excellence in niche areas.
Provide ethical and value based education.
Promote activities to address societal needs.
Network with national and international institutions of repute.

THE PLACEMENT CELL AT IIST

The Placement Cell at IIST continually liaise with industry, R&D organizations, and management Institutions, with the vision of Training, Career-Guidance, Internship/Project, and Campus Placements.

The Placement Cell works in line with the policies of the Institute and tries to coherently match the interests of students with an appropriate job profile.

The Placement Cell channelizes feedback from Industry, R&D Organizations and Management Institutions on academic programmes, to the Institute. The Placement Cell continually functions to safeguard the interest of the students and endeavors to be a part of their safe and secure future.

A company/R&D/Management, registers with the Placement Cell, through an online job portal for the purpose of placement and internship. Upon registration, the Company will receive a Log-In ID and Password to input more details. The Placement Cell will appropriately co-ordinate to take the process further.

The internship period for both B.Tech. and M.Tech. Programmes usually lasts for two months, tentatively from May to July, every year. However, internships which require more than two months, for select M.Tech Programmes, can be worked out in line with the Institute policies and guidelines. The Company/Organization could contact the Placement Cell for further details and discussions.

Students who qualify for Internship/Placements are required to register with the Placement Cell, by providing their CV and related details, well in advance.

FROM THE DIRECTOR'S DESK

Indian Institute of Space Science and Technology (IIST) a Deemed to be University started in the year 2007, is the only National Institute under the umbrella of Dept. of Space dedicated in contributing to the research and education in various key and allied areas of Space Science and Technology. Our B.Tech. students are inducted through a rank list prepared from the students who qualify JEE (Main and Advanced) exams. Students admitted for M.Tech./M.S. and Ph.D programmes are also those who have qualified GATE for Engineering streams and NET/JRF for non-engineering streams.

IIST upholds an urge to develop and continuously strengthen research with various industries, defense sectors, and research organizations. With a rigor of Academic programmes at par with IITs, and Research labs being continuously upgraded with state-of-the-art facilities. IIST provides the right ambience for faculty and students to work extensively in specialized areas of research in collaboration with different ISRO Centres. IIST is always live with colloquia, seminars, conference, lectures by eminent experts in different fields so as to fuel the flames of blowing knowledge. IIST always encourages innovative ideas to grow and strive to gain international recognition for its academic programmes and research activities. The Institute churns out graduates and post-graduates capable of working in cutting edge technologies.

The academics and research ambience at IIST is well knitted with excellent infrastructure for indoor and outdoor activities/sports, fitness centres, cafeteria and an excellent library complex. Residential academic programme at IIST thereby moulds and hones the best of the talents within its students. This document gives a glimpse of our Faculty, research capabilities, along with various academic programmes and detailed curriculum.

I hope industries and research organizations would find this brochure to be a catalyst in initiating various research and collaborative programmes with us. I earnestly hope they would get in touch with our placement cell for inducting our students for their internship programmes and also for providing them with a career opportunity by allowing them to be a part and parcel of research, development and growth of the organization.

Dr. V. K. Dadhwal
Director

from the placement desk.....

With a bright set of students who have undergone a rigorous curriculum at IIST and capable of working at cutting edge technologies, Placement Cell has a key role in ensuring that our students are appropriately placed and continuously contribute to the growth of our nation. IIST values feedback from various industries and research organizations and hence the placement cell liaisons with industry and research organizations to arrange interactive sessions to receive feedback on academic programmes, programmes to hone specific skill sets, etc.

We hope that this booklet brings out key features of our institute. Typical procedure for internship and placements and that industry/research organization is also briefly indicated. We are confident that the students from IIST would be an asset to the organization they would be working in.

We sincerely hope that you would get in touch with us for internship and placements. The placement cell would be happy to provide you with all necessary information and guide you through the process of internship and placement.

Dr. Deepak Mishra
Associate Professor
Dept. of Avionics

Dr. Bijudas C. R
Assistant Professor
Dept. of Aerospace Engineering

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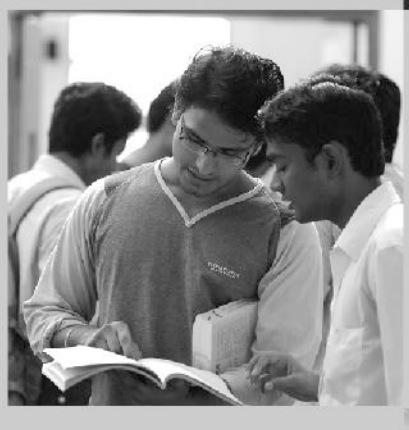
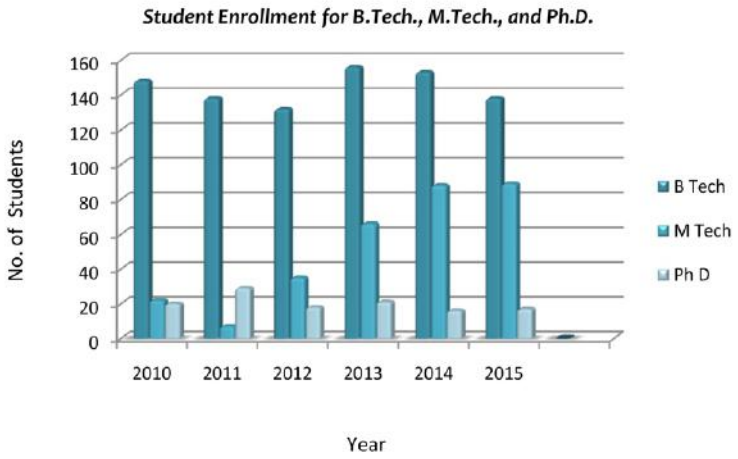


ACADEMIC PROGRAMMES

The institute offers education at the undergraduate, graduate, doctoral and post-doctoral levels with special focus on space sciences, space technology and space applications. The academic programmes have been formulated to strengthen the fundamentals, experience the realities through practical work, and enhance the knowledge and understand the areas of interest. The curriculum has been developed and continuously upgraded to meet these goals.



B.TECH. PROGRAMMES

IIST offers four year (8 semesters) Bachelor of Technology (B.Tech. programme) in 3 branches.

1. Aerospace Engineering
2. Avionics
3. Engineering Physics ***(started from the year 2014)***
4. Dual Degree Programme with B.Tech. Degree in Engineering Physics
   (for batches admitted from 2007 to 2013)

The total number of seats are 156. The seat matrix for different programmes is as follows:

- B.Tech. in Aerospace Engineering: 60
- B.Tech. in Avionics: 60
- B.Tech. in Physical Sciences: 36
- Five Year Dual Degree Programme (B.Tech. - M.S/ M.Tech): 20
  (in take from the year 2014 onwards)

Admission to the B.Tech. programmes in IIST is through Joint Entrance Examination JEE (Main) conducted by CBSE and JEE (Advanced) conducted by IITs.

DUAL DEGREE PROGRAMMES

The first year of the Dual Degree programme covers basic courses in science and engineering (common for all undergraduate programmes.) The second and third years of the programme will comprise mainly of foundation courses in Physics and Engineering. In the fourth year, the student will pursue one of the four post-graduate specialization that will lead to a M.S or M.Tech. degree. The fifth year of the programme is dedicated to a research project work.

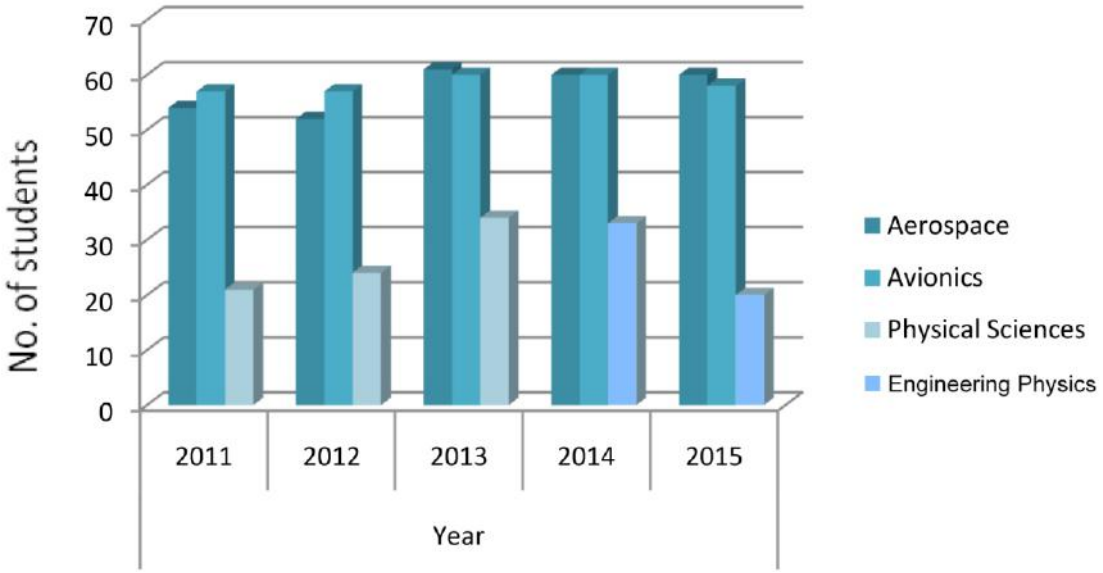
The M.S Programme in Astronomy & Astrophysics aims at introducing students to the application of Physics concepts to planets, stars, galaxies, and the universe as a whole. The course work will enable students with the knowledge base to pursue higher education and research in the diverse areas of astrophysics.

The M.S Programme in Earth System Science aims at introducing students to the science of the Earth System, its components and their interactions. Earth System is the complex system of interacting physical, chemical and biological processes in Planet Earth; manifested through its various elements such as the atmosphere, hydrosphere, geosphere and biosphere. Earth system science deals with the science of the earth system, its components and interaction processes between the components.

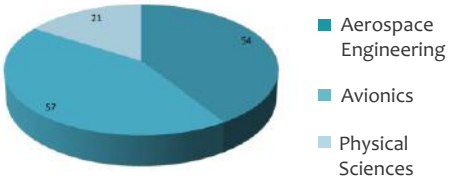
The M.S Programme in Solid State Physics is targeted towards a research career in semiconductor devices, and device physics in general. The programme is also designed as a stepping stone for students interested in pursuing higher research in Condensed Matter Physics.

The M.Tech. Programme in Optical Engineering is designed to meet the present and future technology requirements of the advanced optics industry and relevant R&D organizations. Students will be trained in technologies like Opto-electronics, Lens design and Optical fabrication and Adaptive optics.

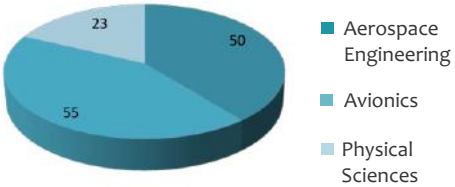
B.Tech. Student Strength across the Discliplines



B.Tech. 2011-2015 Batch

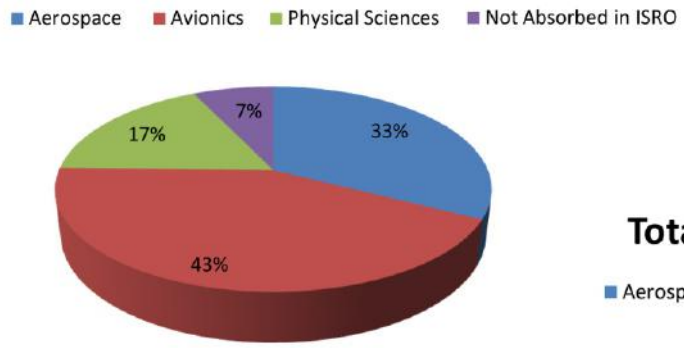


B.Tech. 2012-2016 Batch

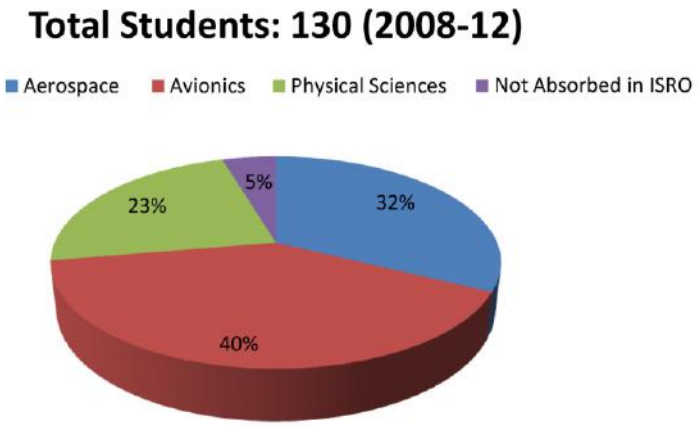


B.Tech. PLACEMENT HISTORY (ISRO ABSORPTION)

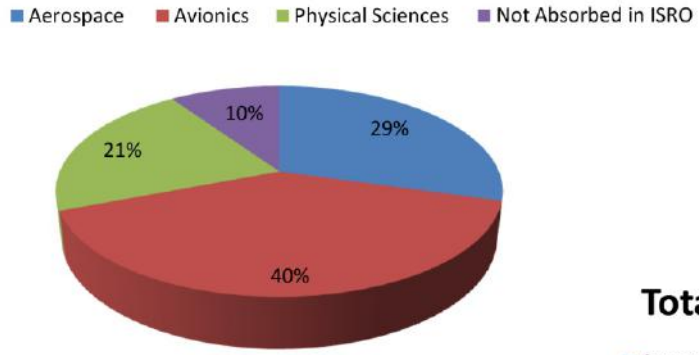
Total Students: 126 (2007-11)



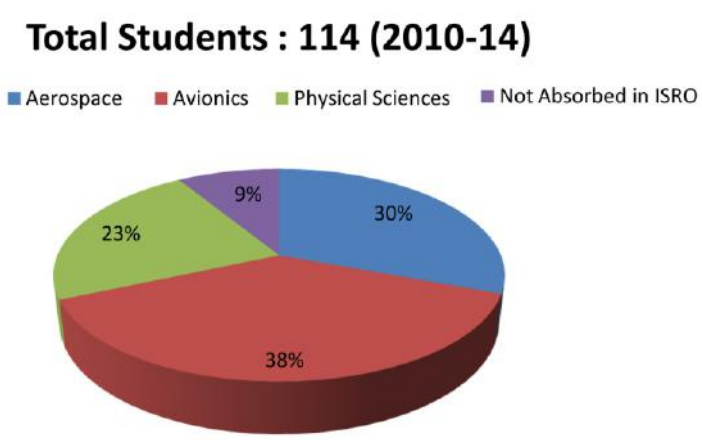
Total Students: 130 (2008-12)



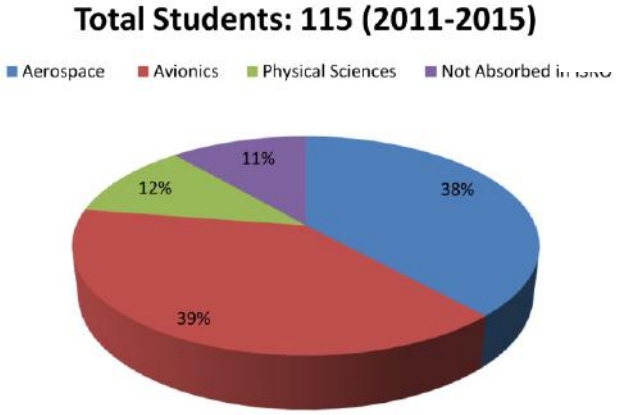
Total Students : 136 (2009-13)



Total Students : 114 (2010-14)



Total Students: 115 (2011-2015)



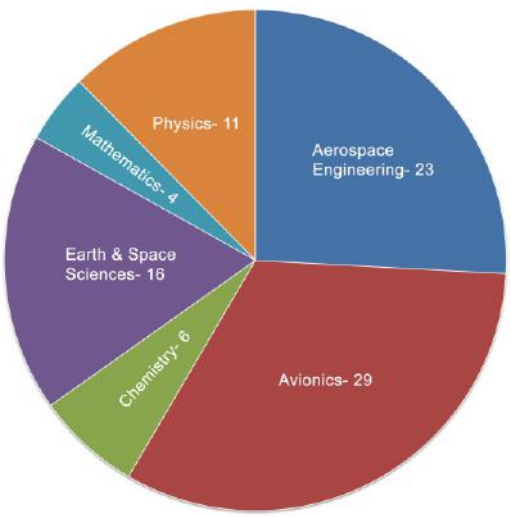
M.TECH. PROGRAMMES/ M.S PROGRAMME

The M.Tech. programme is offered to students who have qualified GATE. Admissions to MS Programme in Astronomy and Astrophysics is based on JEST/JRF/NET/GATE.

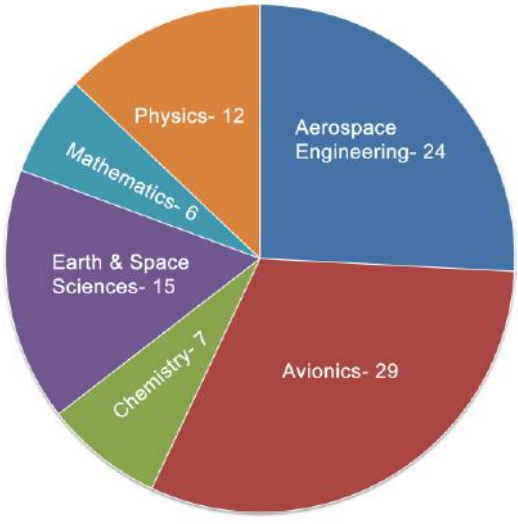
SL.NO	DEPARTMENT	POST GRADUATE PROGRAMMES
1	Aerospace Engineering	1. M.Tech. in Thermal & Propulsion 2. M.Tech. in Aerodynamics & Flight Mechanics 3. M.Tech. in Structures & Design
2	Avionics Engineering	1. M.Tech. in RF&Microwave Engineering 2. M.Tech. in Digital Signal Processing 3. M.Tech. in Control System 4. M.Tech. in VLSI & Microsystems
3	Chemistry	1. M.Tech. in Material Science and Technology
4	Earth & Space Sciences	1. M.Tech. in Earth System Sciences 2. M.Tech. in Geoinformatics 3. MS Astronomy and Astrophysics
5	Mathematics	1. M.Tech. Machine Learning & Computing
6	Physics	1. M.Tech. in Optical Engineering 2. M.Tech. in Solid State Technology

The institute offers education at the undergraduate, graduate, doctoral and post-doctoral levels. Admissions under the regular academic stream are announced through advertisements in national news papers as well as on the IIST website. Admission is based on GATE score, test and interview. All selected candidates will get scholarship as per the AICTE norms.

Admissions under the DOS/ISRO stream are announced through notification circulated in all ISRO Units/Centres. Qualified candidates are admitted to the programme based on nominations by the respective centres.



M.Tech. First Year



M.Tech. Second Year


17-19 December 2012


IIST Research Scholars' Day
17-19 December 2012

ACADEMIC PROGRAMMES

DOCTORAL PROGRAMMES

Doctoral Programme leading to Ph.D. degree is currently available in the following Departments:

- Aerospace Engineering
- Avionics
- Chemistry
- Earth and Space Sciences
- Humanities
- Mathematics
- Physics

The selection of full time Ph.D. scholars is being done twice in a year. The admission to part time Ph.D. programme is offered only to Scientists/Engineers from ISRO and to faculty from IIST. At present there are 102 research scholars registered under the doctoral programme.

POST DOCTORAL PROGRAMMES

IIST offers Post Doctoral Fellowship (PDF) in selected areas. Admission is based on test and interview.

Ph.D. Completed as on Date

Sl. No:	Department	Name
1	Aerospace	1. Shine S.R 2. Litesh Nandkishor Sulbhewar 3. Sooraj. V.S 4. V. Ashok
2	Avionics	1. Ameya Anil Kesarkar
3	Chemistry	1. Jalaja.K 2. Kavitha M.K 3. Remyamol.T 4. R. Narasimman
5	Earth & Space Sciences	1. Bharath Bhushan
6	Mathematics	1. Raja.J 2. Bhaskar Dubey
7	Physics	1. Haripadmam.P.C 2. M.Senthil Kumar 3. Preeti Manjari Mishra 4. Sanid.c

RESEARCH AND DEVELOPMENT

Research Programmes in IIST focus on various areas of Science, Engineering and Humanities. With a view to provide a congenial academic and research atmosphere, the Institute funds projects in various disciplines. Nano Satellite and Sounding Rocket are two prestigious collaborative projects where B.Tech. students get to continually work in close interaction with ISRO scientists. Faculty members currently work with projects, closely related with the Indian Space Programmes. Faculty members could also take up projects both fundamental as well as relating to the cutting –edge technology from reputed Industries/Research Organizations.

To foster the development of new technologies, new centre called **Advanced Space Technology Development Cell** (ASTDC) has been established with ***Shri. Saji Abraham Kuriakose***, Outstanding Scientist as the Head of the Cell. ASTDC is proposed to take advantage of the large student body and faculty of IIST with the core competence of ISRO to develop new technologies required by ISRO in the future. Some of the key objectives laid out are:Identification of new technologies for space missions related to launch to launch vehicles, payloads and advanced satellite systems to be developed in consultation with all ISRO Centres and SCL., and incubate business ideas of IIST students that target aerospace technology applications that could potentially benefit ISRO and contribute towards the national goals for improvement of life of the common man.

The following Centres of Excellence have been established to focus on key technology developments in the field of Space Science and Technology and is being continuously augmented and developed so as to be with the cutting-edge of technology in these areas.

1. APLD LAB. (DEPT. OF AEROSPACE ENGINEERING)

In IIST the Advanced Propulsion and Laser Diagnostics (APLD) Lab is currently setup with an objective to perform propulsion research studies through laser diagnostic techniques. The laboratory currently have the capability to perform PIV and PLIF measurements, and is equipped with: (i) Double Pulsed Nd-YAG PIV Laser , (ii) Precision Dye Laser, (iii) Intensified CCD Camera, (iv) PIV CCD Camera (v) High Resolution Wavemeter, (vi) Optical Tables, (vii) Optical Components and (viii) High Speed DAQ System. The lab would shortly be upgraded with a second dye laser for two line LIF thermometry measurements and particle size analyser for droplet size measurements.

The basic propulsion facilities established as part of academic research projects of students are:

(I) Test Setup for Rocket Injector Spray Characterisation from atmospheric to critical conditions,
(ii) Single Element Coaxial Combustion Facility, and
(iii) Supersonic Free Jet Facility

Research/Project work carried out:

(i) CE-20 and PS4 Injector Spray cone angle, film length and droplet size distribution measurements at atmospheric conditions.
(ii) Absolute density measurements of a jet injected at supercritical conditions to simulate supercritical mixing of hydrogen jet inside combustion chamber.
(iii) Hydroxyl radical concentration measurements in LPG-Air Flame using nonintrusive Laser Induced Fluorescence (LIF) technique.

Relevance to ISRO:

(i) Evaluate the 'Mixing and Combustion' efficiency of the fuel-oxidiser jet for any real scale engines .

(ii) Injector design based on characterisation of jet at supercritical conditions instead of the water-air based characterisation at atmospheric conditions due to the significant deviation from the the injector's performance at actual conditions,

(iii) Identify and Isolate factors causing Combustion Instability and permanently eliminate them.

Works Accomplished:

(I) Design and Characterisation of Liquid Centred Swirl Co-axial Injector(LCSC) in sub critical,critical and super critical regimes.

(ii) Experimentation Investigation of flow through the Double Divergent Nozzles.

(iii) Effect of aft wall offset and ramp on pressure oscillation from supersonic flow over cavity.

Current Status:

(i) Design,development and characterisation of expansion-deflection(ED) rocket engine Nozzle.

(ii) Effect of secondary injection through single point,multi-point and slot on pressure oscillation from supersonic flow over cavity.

(iii) Flow visualisation of Isothermal & Reacting flow with the help of PIV technique.

(iv) Characterisation of a Non-premixed Methane-Air Swirl Burner radial swirl burner design,chemi-luminesence imaging,particle image velocimetry.

2. VIRTUAL REALITY LAB (DEPT. OF AVIONICS)

The primary objective of this lab is to supplement a higher level course on image processing and enable students to understand the subject better. The lab consists of a diverse set of experiments with objective, theory, assessment, references and interactive examples which are designed to improve the clarity in understanding of the basic and advanced concepts. The lab is intended to carry out various experiments and clarify concepts in virtual reality, computer vision and image processing. The lab is equipped five workstations with 3D display and a pair of 5DT data gloves for interaction via computer.

3. CENTER OF ADVANCED RESEARCH IN NANOSCIENCE AND TECHNOLOGY (DEPT. OF CHEMISTRY)

To spearhead the activities in Nanoscience and Technology and to address challenges in Space Science and Technology and related areas the Department has established a Centre of Advanced Research in Nanoscience and Technology. The Department is in the process of realizing all the facilities required to conduct advanced research in Nanoscience and Technology and allied fields. Currently the facilities such as Atomic Force Microscope, Particle Size Analyzer, Glove Box, electrospinning machine, contact angle goniometer, HPLC, planetary ball mill and surface area analyser are available in the centre. Departments plans to add X-ray Diffractometer and Plasma Reactor to the research centre shortly.

The students of IIST have ample opportunity for exposure to foreign universities and establishments. IIST has entered into several international collaborations as outlined below:

California Institute of Technology (CALTECH), USA

CALTECH is a world-renowned university located in Pasadena, California, USA. Every year one student of B.Tech. Aerospace Engineering is admitted for Master of Science degree in Space Engineering at the Graduate Aerospace Laboratories of CALTECH (GALCIT). Support for study will be funded by Satish Dhawan Fellowship. This award will cover full tuition and mandatory fees. Travel expenses and visa fees are met by IIST.

The following three students of IIST have been selected under this programme

Aaditya Nitin Chaphalkar, topper of 2009 B.Tech Aerospace Engineering in the academic year 2013 completed his MS in Space Engineering (18.09.2013-30.06.2014) from CALTECH under the above programme. He also received "The Abdul Kalam Prize" for his exemplary academic performance.

Pranav Nath, topper of 2010 B.Tech. Aerospace Engineering for the academic year 2014 has completed his MS degree in CALTECH.

Anand Kumar, topper of 2011B.Tech. Aerospace Engineering in 2015 is would be joining for MS degree in CALTECH for the 2015- 16 session.

Universities Space Research Association (USRA),USA

USRA is an independent, nonprofit research corporation where the combined efforts of in-house talent and university based expertise merge to advance space science and technology. USRA works across disciplines including biomedicine, planetary science, astrophysics and engineering integrating those competencies into applications ranging from fundamental research to facility management and operations.

USRA and IIST have jointly established an undergraduate student Summer Research Programme (under Exchange Visitor Programme) which provides research opportunities at USRA Institutes and other Universities to outstanding students at IIST. USRA will provide for the housing expenses and per diem. Travel expenses and visa fees will be paid by IIST.

The following students had the opportunity to do their final semester B.Tech. project under this programme during 2011.

Lunar Planetary Research Institute (LPRI), Houston, USA

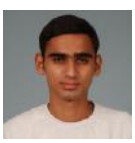
Bhavesh Jaiswal

Ankush Kumar

Vaibhav Dixit

(B.Tech. Physical Sciences)

University of Texas, Arlington, USA



Apoorv Mehta
(Avionics)

Pulkit Goyal
(Aerospace Engineering)

Jet Propulsion Laboratory (JPL), USA

The Jet Propulsion Laboratory is a federally funded research and development center and NASA field center located in La Canada Flintridge, California, United States. JPL is managed by the nearby California Institute of Technology (CALTECH) for NASA.

JPL has offered an 8 week internship programme for three students of B.Tech. in each branch viz, Aerospace Engineering, Avionics and Physical Sciences/Engineering Physics who are in their third year. Students will receive a generous stipend to cover their entire expenses. The expenditure towards airfare, medical insurance coverage,VISA fees and SEVIS fees will be met by IIST.

The students who did their internship at JPL, USA from 01.06.2015-30.07.2015. are

Divesh Soni
(Aerospace Engineering)

Suraj Kumar
(Avionics)

Harshvardhan Singh
(Physical Sciences)

Lockheed Martin's Undergraduate Student Visitation Program

Lockheed Martin, the American global aerospace, defense, security and advanced technology company with worldwide interests has an Undergraduate Student Visitation Program at the LM Advanced Technology Centre (LM ATC) located at Palo Alto, California.

This program is administered by the binational Indo US Science and Technology Forum (IUSSTF), New Delhi. The goal of this programme is to create, nurture and support techno-entrepreneurial ecosystems. The duration of the programme will be eight weeks during summer. The visitation program will cover accommodation, local transportation, and international air travel support.

The students(B Tech. Avionics)of IIST who had the opportunity to be selected for this program. (03.03.2015 - 08.04.2015)

Sourajith Debnath

Gulashan Gupta

Mitacs Globalink Reseach Foundation, Canada

The Mitacs Globalink Research Internship is a competitive initiative for international undergraduates from Brazil, China, France, India, Mexico, Saudi Arabia, Tunisia and Vietnam. From May to September of each year, top-ranking applicants participate in a 12-week research internship under the supervision of Canadian university faculty members in a variety of academic disciplines, from science, engineering and mathematics to humanities and social sciences. Over 45 universities across Canada are hosting Mitacs Globalink Research interns in the summer of 2015. The entire expenditure towards air fare, accommodation, living stipend, medical insurance, student registration fees is met by Mitacs Globalink Reseach Foundation.

This year **Shashank Nitundil**, 3rd year B.Tech. Aerospace Engineering student has done summer internship at University of Alberta, Edmonton, Canada from 11.05.2015 to 04.08.2015.

In addition to the above collaborations, students are encouraged to register themselves for international internships on their own during their vacation period.

Yogesh Parth, 3rd year B.Tech. Avionics student was selected for Bachelor Summer Program at Joseph Fourier Universite – Grenoble France from 02.06.2014-11.07.2014.

DEPARTMENT OF AEROSPACE ENGINEERING

The Department of Aerospace Engineering was established in the year 2007 and currently offers, a four year Programmes B.Tech. and three M.Tech. Programmes namely Aerodynamics, Thermal and Propulsion and Structures and Design. The Department also has Ph.D. Programmes and Post Doctoral Programmes. The Department's research capabilities could be broadly grouped into (1) Aerodynamics and Flight Mechanics, (2) Thermal and Propulsion, (3) Design and Structures, and (4) Materials and Manufacturing.

The curricula of various courses offered by the Department of Aerospace Engineering deals with design and development of aircrafts, launch vehicles and spacecrafts. Unlike most traditional ground based systems, optimality and reliability are of paramount importance in such systems. This necessitates accurate theoretical and experimental analyzes of a variety of phenomena, and performance predications of a variety of complex systems.

The department of Aerospace was established in the year 2007 and currently offers a four year B.Tech. Programme and M.Tech. in Aerodynamics and Flight Mechanics, Propulsion, Structures and Design and Ph.D. Programmes.

Faculty members of the Aerospace Engineering at IIST are graduates of reputed institutions who are supported by experienced and competent Technical staff force. We believe that engineering education is incomplete without exposure to real life phenomena and without developing the ability to experimentally investigate the performance of actual systems.

The academic programmes (B.Tech., M.Tech. & Ph.D.) contributes more to the technical excellence in all realms of Aerospace Engineering and triggers the young minds to undertake challenging projects, research in cutting edge technology in various aspects of Propulsion Systems, Aerodynamic Design, Structural Systems, Precision Manufacturing, etc.

Currently, the department proclaims a state -of- art in the area of Advanced Propulsion and Laser Diagnostics, and plans to enhance its research facilities in the following areas:

- High Speed Flow Facility
- Hypersonic Boundary Layer Prediction
- Sub-scale Semi-Cryogenic Rocket Combustion Chamber Facility
- Structural Health Monitoring
- Combustion Studies
- High Temperature Gas Gynamics Facility
- Aero-acoustic Test Facility
- Inter-disciplinary Research Facility for Gas Liquid Flow and Heat Transfer

LABORATORY FACILITIES (DEPT. OF AEROSPACE ENGINEERING)

- Advanced Propulsion, Laser Diagnostics & High Speed Flow Lab

- Aerodynamics Lab
- Aerospace Structures Lab
- Computer Aided Design and Analysis Lab
- Engineering Drawing Lab
- Engineering Workshop
- Flight Mechanics Lab
- Fluid Mechanics Lab
- Heat transfer Lab
- Manufacturing Processes Lab
- Metrology and Computer Aided Inspection lab
- Physical Metallurgy Lab
- Propulsion Lab
- Strength of Materials Lab
- Thermal Engineering Lab

FACULTY PROFILE (DEPT. OF AEROSPACE ENGINEERING)

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Area of Research: Combustion, Laminar premised flames and Emission studies

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Area of Research: Finite Element Method, Analysis of aerospace structures

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Area of Research: Gas Dynamics, Hypersonic flows, Experimental Aerodynamics

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Education: Ph.D., IIST Thiruvananthapuram
Additional Professional Qualification: Boiler Proficiency Engineer, Certified Energy Auditor, Ministry of Power, Government of India
Area of Research: Rocket thrust chamber cooling, Film cooling applications

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Area of Research: Aerodynamics, Aeroacoustics, Unsteady flows, Experimental methods

CURRICULUM (DEPT. OF AEROSPACE ENGINEERING)

B.TECH. IN AEROSPACE

SEMESTER I (22CREDITS)

Code	Course Title
MA111	Calculus
PH111	Physics I
CH111	Chemistry
AE111	Introduction to Aerospace Engineering
AV111	Basic Electrical Engineering
HS111	Communication Skills
PH131	Physics Lab
AE131	Basic Engineering Lab

SEMESTER II (20 CREDITS)

Code	Course Title
MA121	Vector Calculus and Differential Equations
MA122	Computer Programming & Applications
PH121	Physics II
CH121	Materials Science & Metallurgy
AV121	Basic Electronics Engineering
CH141	Chemistry Lab
AE141	Engineering Graphics
AV141	Basic Electrical and Electronics Engineering Lab

SEMESTER III (20 CREDITS)

Code	Course Title
MA211	Linear Algebra, Numerical Analysis, and Transforms
AE211	Engineering Thermodynamics
AE212	Mechanics of Solids
AE213	Fluid Mechanics
Ae214	Manufacturing Technology
HS211	Introduction to Economics
AE231	Machine Drawing
AE232	Strength of Materials Lab

SEMESTER IV (21 CREDITS)

Code	Course Title
MA221	Partial Differential Equatuions, Calculus of variations and Complex Analysis
AE221	Gas Dynamics
AE222	Heat Transfer
AE223	Kinematics and Dynamics of Mechanisms
AE224	Metrology and Computer Aided Inspection
HS221	Introduction to Social Science and Ethics
Ae241	Thermal and Fluid Lab

SEMESTER V (21 CREDITS)

Code	Course Title
MA311	Probability and Statistics
AE311	Aerodynamics
AE312	Aerospace Structures I
AE313	Manufacturing Technology II
AV315	Instrumentation and Control Systems
CH311	Environmental Science and Engineering

SEMESTER VI (23 CREDITS)

Code	Course Title
AE321	Atmospheric Flight Mechanics
AE322	Spaceflight Mechanics
AE323	Air-Breathing Propulsion
AE324	Aerospace Structures II
E01	Elective I
Hs321	Principles of Management Systems

AE331	Aerodynamics Lab	AE341	Aerospace Structures Lab
AE332	Metrology Lab	AE342	Manufacturing Processes Lab
AV335	Instrumentation and Control Systems Lab	AE343	Modeling and Analysis Lab

SEMESTER VII (24 CREDITS)

Code	Course Title
AE411	Rocket Propulsion
AE412	Aerospace Vehicle Design
E02	Elective II
E03	Elective III
E04	Elective IV
E05	Institute Elective
AE431	Flight Mechanics and Propulsion Lab
AE451	Summer Internship and Training
AE452	Comprehensive Viva-Voce I

SEMESTER VIII (15 CREDITS)

Code	Course Title
AE453	Comprehensive Viva-Voce II
AE454	Project Work

Elective Courses

Sl No.	Code	Course Title
1.	AE461	Advanced Aerodynamics
2.	AE462	Advanced Aerospace Structures
3.	AE463	Advanced Fluid Mechanics
4.	AE464	Advanced Heat Transfer
5.	AE466	Structural Dynamics and Aeroelasticity
6.	AE467	Analysis and Design of Composite Structures
7.	AE468	Computational Fluid Dynamics
8.	AE469	Computer Integrated Manufacturing
9.	AE470	Design of Aerospace Structures
10.	AE471	Convection Heat Transfer
11.	AE472	Experimental Aerodynamics
12.	AE473	Finite Element Method
13.	AE474	Fracture Mechanics
14.	AE475	Engineering Vibration
15.	AE476	Industrial Engineering
16.	AE477	Fundamentals of Combustion
17.	AE478	Supply Chain Management
18.	AE479	Introduction to Optimization
19.	AE480	Nontraditional Machining
20.	AE481	Operations Research
21.	AE483	Introduction to Robotics
22.	AE484	Space Mission Design and Optimization
23.	AE486	Refrigeration and Cryogenics
24.	AE489	Aerospace Materials and Processes
25.	AE491	Structural Dynamics
26.	AE493	Two Phase Flow & Heat Transfer
27.	AE496	Multi Disciplinary Design Optimization
28.	AE498	Computational Methods for Compressible Flow
29.	AE499	Elastic Propagation in Solids

M.TECH. IN AERODYNAMICS AND FLIGHT MECHANICS

SEMESTER 1 (18 CREDITS)

Code	Course Title
AE601	Mathematical Methods in Aerospace Engineering
AE602	Elements of Aerospace Engineering
AE603	Aerodynamics
AE604	Atmospheric Flight Mechanics
AE612	Aerospace Propulsion
Ae613	Compressible flow

SEMESTER II (18 CREDITS)

Code	Course Title
AE605	Flight Dynamics and Control
AE606	Spaceflight Mechanics
E02	Elective ii
E03	Elective iii
E04	Elective iv
AE801	Aerodynamics and Flight Mechanics Lab
AE851	Seminar

SEMESTER III (18 CREDITS)

Code	Course Title
AE607	Aerospace Vehicle Design
E05	Elective V
AE853	Project Work – Phase 1

SEMESTER IV (18 CREDITS)

Code	Course Title
AE854	Project Work – Phase II

Elective Courses

Sl No	Code	Course Title
1	AE821	Experimental Aerodynamics
2	AE822	Aeroacoustics
3	AE823	Hypersonic Aerothermodynamics
4	AE824	Turbulence in Fluid Flows
5	AE825	Advanced Computational Fluid Dynamics
6	AE826	Navigation Guidance and Control
7	AE827	Optimal Control Theory
8	AE828	Space Mission Design
9	AE829	Multi-disciplinary Design Optimization
10	AE618	Finite Element Methods

M.TECH. IN THERMAL AND PROPULSION

SEMESTER I (18 CREDITS)

Code	Course Title
AE601	Mathematical Methods in Aerospace Engineering
AE602	Elements of Aerospace Engineering
AE611	Fluid Dynamics
AE612	Aerospace Propulsion
AE613	Compressible Flow
Ae614	Advanced Heat Transfer

SEMESTER II (14CREDITS)

Code	Course Title
AE615	Aerospace Propulsion
Ae616	Computational Fluid Dynamics
E01	Elective I
E02	Elective II
E03	Elective III
E04	Elective IV
AE802	Thermal and Propulsion Lab

SEMESTER III (17 CREDITS)

Code	Course Title
E05	Elective V
AE852	Project Work – Phase I

SEMESTER IV (18 CREDITS)

Code	Course Title
AE853	Project Title – Phase II

Elective Courses

Sl No.	Code	Course Title
1	AE812	Cryogenic Engineering
2	AE813	Computational Fluid Dynamics
3	AE814	Turbomachines
4	AE815	Boiling and Condensation
5	AE816	Hypersonic Air- Breathing Propulsion
6	AE817	Measurements in Fluid and Thermal Sciences
7	AE818	Microscale and Nanoscale Heat Transfer
8	AE819	Shockwave Dynamics
9	AE820	Two-Phase Flow and Heat Transfer

M.TECH. IN STRUCTURES AND DESIGN

SEMESTER I (18 CREDITS)

Code	Course Title
Ae601	Mathematical Methods in Aerospace Engineering
AE602	Elements of Aerospace Engineering
Ae621	Advanced Solid Mechanics
Ae622	Finite Element Methods

SEMESTER II (17 CREDITS)

Code	Course Title
Ae623	Fracture Mechanics and fatigue
AE624	Advanced Finite Element Method
AE663	Mechanics of Composite Materials
E01	Elective-III
E02	Elective-IV
Ae807	Aerospace Structures Lab
Ae851	Seminar

SEMESTER III (18 CREDITS)

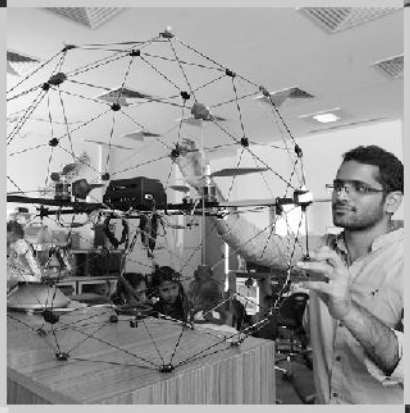
Code	Course
Ae853	Project Work-Phase I
Ae607	Aerospace Vehicle Design
E03	Elective III

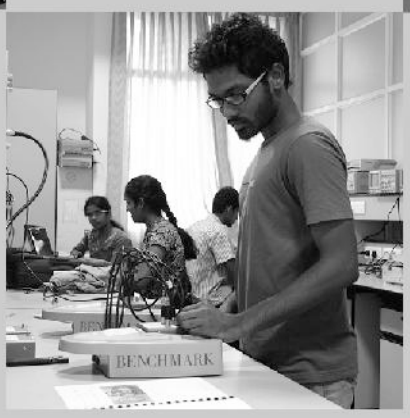
SEMESTER IV (18 CREDITS)

Code	Course Title
Ae805	Project Work – Phase II

Elective Courses

Sl. No.	Code	Course Title
1	AE841	Operations Research
2	AE842	Continuum Mechanics
3	AE843	Introduction to Robotics
4	AE844	Multi-rigid Body Bynamics
5	AE845	Aerospace Materials and Processes
6	AE846	Energy Methods in Structural Mechanics
7	AE847	Molecular Dynamics and Materials Failure




BENCHMARK

DEPARTMENT OF AVIONICS

An Aspiring student of Avionics is exposed to tasks related to designing and programming electrical systems on board spacecraft, aircraft and satellites. The work role requires providing computer system support for communication, navigation and guidance systems and performs testing to ensure that systems are working properly.

The Department of Avionics at the Institute was established in the year 2007 and it offers a four year B.Tech. in Avionics and 2 years M.Tech. Programme in

- RF & Microwave Engineering
- Digital Signal Processing
- Control System
- VLSI & Microsystems

Ph.D Programmes, that gives technical exposure in the broad areas of Avionics Engineering such as:

- Digital System Design
- Digital Communication
- RF & Microwave Engineering
- VSLI Design
- Navigation, Guidance and Control
- Computer Science and Engineering
- Power Electronics

The quality and reliability of electronics used in Aerospace vehicles and Space applications, in general, have to meet the stringent requirements of space environments for prolonged duration.

The academic programme in Avionics Department stresses on fundamentals and greater thrust is given to enhance research ability to undertake challenges in the field of electronics and communication required for Space Vehicle Applications.

Main vision of the Department is to generate human resource with substantial knowledge, skills, and experience in the area of Avionics Engineering at the graduate, postgraduate and Ph.D. level.

It is also envisaged to undertake futuristic research in areas related to Space Science and Technology which can be fed to ISRO and other relevant industrial programmes at suitable juncture. With this in mind, a well organized academic and research programme supported with lab facilities comparable with the world class institutions is planned to achieve excellence in the field of Space Science and Technology and to meet the national requirements in the field of Science and Technology.

The Department has excellent lab facilities and state-of-art software tools for VLSI design for front end back end design, CAD software for design of analog circuits, Microwave Circuits and Components with the tie up for fabrication of devices at various foundries which provide good opportunity to the students and researchers to learn, design and innovate. The department provides access to the various laboratories of ISRO and other relevant industries through Internships and Projects for students to get hands on experience with some of the challenging tasks for space programmes.

A full-fledged Virtual reality Laboratory to stimulate a real life environment for Space Science and Research is also being established.

LABORATORY FACILITIES (DEPT. OF AVIONICS)

- Basic Electronics Lab
- Basic Electrical Lab
- Analog Electronics Lab
- ECAD Lab
- Digital Electronics Lab
- RF & Microwave Lab
- Micro Processor Lab
- Digital Communication Lab
- Digital Signal Processing Lab
- Instrumentation and Measurement Lab
- Control System Lab
- Power Electronics Lab
- Computer Networks Lab
- VLSI Lab
- Navigation Systems and Sensor Lab

THRUST AREAS OF RESEARCH

- Fault Tolerant Systems
- Adaptive Control Systems
- Robotics
- Virtual Instrumentation & Smart Systems
- Virtual reality and 3D image processing
- Power Electronics
- Smart Sensors and Networking
- MIMO OFDM Communication Systems
- Micro-Nano Electronics
- Micro-Electro Mechanical Systems (MEMS)
- Microwave Circuits and Antennas
- Signal Processing
- Computer Networking

FACULTY PROFILE (DEPT. OF AVIONICS)

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Education: Ph.D. IISc, Bangalore

CURRICULUM (DEPT. OF AVIONICS)

B.TECH. IN AVIONICS

SEMESTER I (22 CREDITS)

Code	Course Title
MA111	Calculus
PH111	Physics I
AE111	Introduction to Aerospace Eng.
AV111	Basic Electrical Engineering
Hs111	Communication Skills
PH131	Physics Lab
CH131	Chemistry Lab
AE131	Basic Engineering Lab

SEMESTER II (20 CREDITS)

Code	Course Title
MA121	Vector Calculus and Differential Equations
MA122	Computer Programming & Applications
PH121	Physics II
CH121	Materials Science
AV121	Basic Electronics Engineering
AV141	Engineering Graphics
	Basic Electrical and Electronics Engineering Lab
CH141	Chemistry Lab

SEMESTER III (20 CREDITS)

Code	Course Title
MA211	Linear Algebra, Numerical Analysis and Transforms
AV211	Analog Electronic Circuit
AV212	Semi Conductor Devices
AV213	Signal and Systems
AV214	Electromagnetic and Wave Propagation
HS212	Introduction to Social Science and Ethics
Av231	Analog Electronics Circuit Lab
AV232	E-CAD Lab

SEMESTER IV (23 CREDITS)

Code	Course Title
MA221	Partial Differential Equations,Calculus of Variation and Complex Analysis
AV221	Digital Electronics and VLSI Design
AV222	Microprocessor and Microcontrollers
AV223	RF and Microwave Communication
AV224	Computer Organization and OS
HS222	Introduction to Economics
AV241	Digital Electronics Lab
AV242	VLSI Design Lab
AV243	Microprocessor and Microcontroller Lab
AV244	RF and Microwave Communication Lab

SEMESTER V (22 CREDITS)

Code	Course Title
MA311	Probability and Statistics
AV311	Digital Signal Processing
AV312	Digital Communication
AV313	Control and Guidance Systems
AV314	Instrumentation and Measurement
CH311	Environmental Science and Engineering
Av331	Digital Signal Processing Lab
AV332	Digital Communication Lab
AV333	Control and Guidance Lab
AV334	Instrumentation and Measurement Lab

SEMESTER VI (19 CREDITS)

Code	Course Title
AV321	Computer Networks
AV322	Power Electronics
AV323	Radar Systems
E01	Elective I
ES322	Introduction to Space Science and Applications
HS321	Principles of Management Systems
AV341	Computer Networks Lab
AV342	Power Electronics Lab

SEMESTER VII (22 CREDITS)

Code	Course Title
AV411	Navigation Systems and Sensors
E02	Elective II
E03	Elective III
E04	Elective IV
I01	Institute Elective
AV431	Navigation Systems and Sensors Lab
AV451	Summer Internship and Training
Av452	Comprehensive Viva-Voce I

SEMESTER VIII (15 CREDITS)

Code	Course Title
AV453	Comprehensive Viva-Voce II
AV454	Project Work

Elective Courses

Sl. No.	Code	Course Title
1	AV461	Advanced Control Theory
2	AV462	Embedded Systems and Real Time OS
3	AV463	Soft Computing
4	AV464	Advanced DSP and Adaptive Filter
5	AV465	Robust and Optimal Control
6	AV466	Estimation and Stochastic Theory
7	AV467	Introduction to Optimization and OR
8	AV468	Digital Control System
9	AV469	EMI/EMC
10	AV470	Digital Image Processing
11	AV471	VLSI Design
12	AV472	Opto-Electronics and Fiber Optics Communication
13	AV473	Information Theory and Coding
14	AV474	Cryptography

15	AV475	Mobile Communication
16	AV476	Microwave Integrated Circuits
17	AV477	Antenna Engineering
18	AV478	Satellite Communication
19	AV479	Computer Graphics
20	AV480	Graph Theory and OR
21	AV481	Modern Algebra and Tensors
22	AV482	Data Structure and DBMS
23	AV483	Software Engineering
24	AV484	Wireless Mesh Network
25	AV485	Microelectronics and Microsystem Technologies
26	AV486	Antenna Active and Passive
27	AV487	Virtual Reality

M.TECH. IN RF AND MICROWAVE ENGINEERING

SEMESTER I (17 CREDITS)

Code	Course Title
AVR611	Advanced Electromagnetic Engineering
AVR612	Microwave Circuits and Systems
AVR613	Microwave Semiconductor Devices
MA615	Advanced Engineering Mathematics
AVR631	Microwave Circuit Lab

SEMESTER II (18 CREDITS)

Code	Course Title
AVR621	Antenna Theory and Design
AVR622	Computational Methods for Electromagnetics
E01	Elective I
E02	Elective II
AVR641	Antenna Design Lab
AVR851	Seminar

SEMESTER III (15 CREDITS)

Code	Course Title
E03	Elective III
AVR852	Dissertation – Phase 1

SEMESTER IV (20 CREDITS)

Code	Course Title
AVR853	Dissertation – Phase II

Elective Courses

Sl No.	Code	Course Title
1	AVR861	RF IC Microwave MEMS
2	AVR862	Millimeter Wave Integrated Circuits
3	AVR863	RF Packaging And Electromagnetic Compatibility
4	AVR864	Adaptive And Smart Antennas
5	AV4865	Phased Array Antennas
6	AVR866	Satellite Communication
7	AVR867	Optoelectronics And Fiber Optic Communication
8	AVR868	Wireless Channels And UWB Radios
9	AVR869	Remote Sensing

M.TECH. IN DIGITAL SIGNAL PROCESSING

SEMESTER I (17 CREDITS)

Code	Course Title
AVD611	Advanced Signal Analysis and Processing
AVD612	Mathematical Methods for Signal Processing
AVD613	Communication Systems I
AVD867	Pattern Recognition and Machine Learning
AVD614	Image and Video Processing
AVD631	Digital Communication Lab
AVD632	Image and Video Processing Lab

SEMESTER II (18 CREDITS)

Code	Course Title
AVD621	Statistical Signal Processing
AVD622	Digital Signal Processors For Real Time Applications
E01	Elective I
E02	Elective II
AVD641	DSP Hardware Lab
AVD851	Seminar
AVD623	Communication System II

SEMESTER III (17 CREDITS)

Code	Course Title
E03	Elective III
AVD852	Project Work – Phase I

SEMESTER IV (20 CREDITS)

Code	Course Title
AVD854	Project Work – Phase II
AVD855	Seminar

Elective Courses

Sl No:	Code	Course Title
1	AVD861	Speech Signal Processing and Coding
2	AVD862	Information Theory And Coding
3	AVD863	Soft Computing And Its Application In Signal Processing
4	AVD864	Computer Vision
5	AVD865	Multimedia Processing Lab Courses
6	AVD866	Virtual Reality
7	AVD867	Pattern Recognition & Machine Learning
8	AVD868	VLSI Signal Processing

M.TECH. IN CONTROL SYSTEMS

SEMESTER I (19 CREDITS)

Code	Course Title
AVC611	Mathematics for Control
AVC612	Linear Control System
AVC613	Digital Control and Embedded Systems
AVC614	Principles of Feedback Control
E01	Elective I
E02	Elective II
AVC631	Digital Control and Embedded Systems lab

SEMESTER II (18CREDITS)

Code	Course Title
AVC621	Optimal Control Systems
AVC622	Non Linear Dynamical Systems
AVC623	Robust Control Design
E03	Elective III
E04	Elective IV
AVC851	Design Project

SEMESTER III (18 CREDITS)

Code	Course Title
AVC852	Seminar
AVC853	Project Work – Phase I

SEMESTER IV (18 CREDITS)

Code	Course Title
AVC854	Project Work – Phase II

Elective Courses

Sl No.	Code	Course Title
1	AVC861	Introduction to Robotic Systems
2	AVC862	Mobile Robotics and Visual Servoing
3	AVC863	Adaptive Control Theory
4	AVC864	Modelling of Launch Vehicle and Space Craft Dynamics
5	AVC865	Machine Learning and Control
6	AVC866	Fractional Calculus and Control
7	AVC867	Optimization
8	AVC868	Geometric Approach to Mechanics and Control
9	AVC869	System Identification and Parameter Estimation
10	AVC870	Modelling and Control of Power Electronic Converters
		Open Elective From DSP related to Filtering
		Open Elective from Aerospace Engineering related to Space and Flight Mechanics

M.TECH. IN VLSI & MICROSYSTEMS

SEMESTER I (16 CREDITS)

Code	Course Title
AVM611	Physics of Micro and Nanoelectronic Devices
AVM612	Introduction to Micro Electro Mechanical Systems (MEMS)
AVM613	Analog VLSI Circuits
AVM614	Digital VLSI Circuits
AVM631	VLSI Design Lab

SEMESTER II (18 CREDITS)

Code	Course Title
AVM621	Mixed Signal VLSI Design
AVM622	Micro/Nano Fabrication Technology
E01	Elective I
E02	Elective II
AVM641	MEMS Lab
AVM642	Microelectronics Lab
AVM851	Seminar
AVM852	Comprehensive Viva

SEMESTER III (18 CREDITS)

Code	Course Title
E03	Elective III (Self Study)
AVM853	Project Work – Phase I

SEMESTER IV (18 CREDITS)

Code	Course Title
AVM854	Project Work – Phase II

Elective Courses

Sl.	Code	Course Title
1	AVM861	RF MEMS
2	AVM862	High Frequency VLSI Circuits
3	AVM863	Thin films: Materials and Characterization
4	AVM864	VLSI Digital Signal Processing
5	AVM865	MEMS Integration
6	AVM866	Sensors and Actuators
7	AVM867	Power Semiconductor Devices
8	AVM868	Compound Semiconductor Devices and Technology
9	AVM869	EDA Principles and Practices
10	AVM870	Micro Fluids & Bio MEMS
11	AVM871	Testing and Verification of VLSI Circuits

DEPARTMENT OF CHEMISTRY

The Department of Chemistry was established on 2007. The Department is offering Chemistry courses and Elective courses for B.Tech. and also offers M.Tech. in Material Science and Technology.

The Department has also started a Centre for Advanced Research in Nanoscience and Technology.

The Department promotes interdisciplinary and interdepartmental research activities. At present, the Department is collaborating with various premier institutions in the country.

LABORATORY FACILITIES (DEPT. OF CHEMISTRY)

- General Chemistry Lab
- Inorganic Chemistry Lab
- Nanoscience and Technology Lab
- Organic Chemistry Lab
- Physical Chemistry Lab
- Chemical Engineering Lab
- Polymer Processing Lab
- Material Characterization Lab

FACULTY PROFILE (DEPT. OF CHEMISTRY)

Nirmala Rachel James
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Education: Ph.D., University of Pune
Area of Research: Step growth polymers, Polymers for medical applications, Hydrogels and nanofibers for tissue engineering, nanogels for drug delivery applications

Kuruvilla Joseph
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Education: Ph.D., RRL, CSIR, Thiruvanathapuram, in collaboration with School of Chemical Sciences, Mahatma Gandhi University, Kottayam
Area of Research: Polymer based micro and nanocomposites, Synthesis of polymers from natural resources, Green materials and bio-composites, Commingled Polymer composite systems, Polymer-Polymer microfibrillar composites, Ageing and degradation

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Education: Ph.D., IIT, Kharagpur
Area of Research: Plasma Surface Modification, Surface functionalization of polymers, Enhancement of bio and blood compatibility, Biosensor, Nanocomposite

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Assistant Professor
Email : jobincyriac@iist.ac.in, Phone(Off) : 0471-2568535, Fax : 0471-2568541
Education: Ph. D., IIT, Madras
Area of Research: Ion/surface interaction, Preparative mass spectrometry, Ice chemistry, Surface science |Instrumentation

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Education: Ph.D., NIIST, Thiruvananthapuram (Affiliated to CUSAT)
Areas of Research: Functional Nanomaterials, Self-assembly and Scanning Probe Microscopy, Nanosystems for Biomedicine

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Education: Ph.D., NIIST, Thiruvananthapuram
Area of Research: Inorganic and Nanomaterials for energy storage, surface coatings and sensing applications, Molecularly imprinting technology, Preconcentration/ separation, Trace analysis

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Education: Ph.D., RRL, Thiruvananthapuram
Areas of Research: Surface chemistry and ceramic powder dispersions, Advanced ceramic powder processing technologies, Porous ceramics and ceramic foams, Synthesis of nanocrystalline ceramic powders, Porous carbon materials

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Education: Ph.D., RRL, Thiruvananthapuram
Areas of Research: Liquid Crystalline Polymers, Nonlinear Optical Polymer, Biomaterials for Tissue Engineering, Dye Sensitized/Organic Solar Cells, Self Assembled Materials

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Assistant Professor
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Education: Ph.D., Univ. of Kerala
Area of Research: Synthetic Organic Chemistry, Combinatorial Chemistry for material development, Dendrimer synthesis and applications, Drug delivery systems, Drug discovery, Peptide-based scaffolds for regenerative medicine, Supramolecular assemblies

CURRICULUM (DEPT. OF CHEMISTRY)

M.TECH. IN MATERIALS SCIENCE AND TECHNOLOGY

SEMESTER I (20 CREDITS)

Code	Course Title
CHM611	Fundamentals of Materials Science
CHM613	Mathematical Modeling and Simulation
CHM614	Materials Characterizations Techniques
E01	Elective I
CHM631	Polymer Science and Materials Characterization Lab
CHM632	Modeling and Simulation Lab
CHM 633	Materials Synthesis & Characterization

SEMESTER II (20 CREDITS)

Code	Course Title
CHM621	Processing and Design of Materials
CHM623	Composites Science and Technology
CHM624	Aerospace Material
E02	Elective 2
E03	Elective 3
CHM641	Composite/Processing Lab
CHM644	Aerospace Materials Lab
CHM645	Mini Project
CHM646	Seminar

SEMESTER III (15 CREDITS)

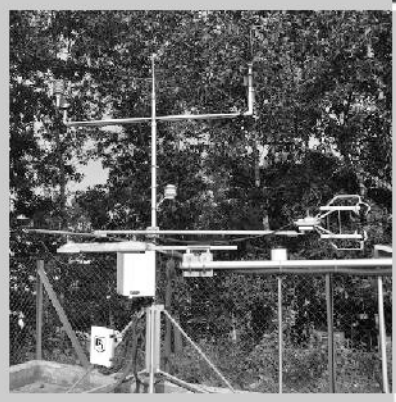
Code	Course Title
CHM711	Energy Storage and Energy Conversion MaterialS
CHM851	Project Work – Phase I

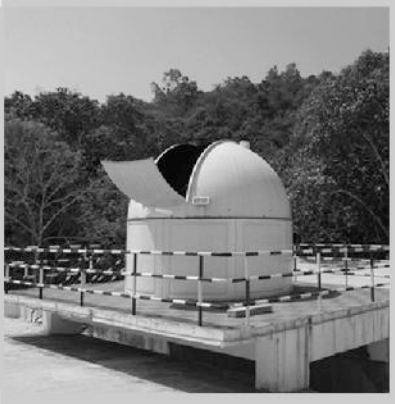
SEMESTER IV (18 CREDITS)

Code	Course Title
CHM852	Project Work – Phase 2

Elective Courses

Sl No.	Code	Course Title
1	CHM862	Soft Materials
2	CHM864	Chemical Rocket Propellants
3	CHM865	Thin Films and Surface Engineering
4	CHM866	Mechanical Behavior of Materials
5	CHM868	Advanced Characterization Techniques
6	CHM871	Electronic, Photonic and Magnetic Materials
7	CHM872	Fundamentals of Polymer Science
8	CHM873	Speciality Polymers
9	CHM874	Rubber Technology
10	CHM875	Smart & Intelligent Materials
11	CHM876	Materials for Energy Storage & Energy Conversion





DEPARTMENT OF EARTH AND SPACE SCIENCES

The Earth & Space Sciences is the youngest department of the institute. The department is inter-disciplinary in nature, bridging gaps between technology and its application to fundamental research areas in physical sciences.

At IIST, Earth & Space Sciences spearheads the task of undergraduate teaching in B. Tech Physical Sciences.

In addition, the Earth & Space Sciences Department offers post-graduate programs in Earth System Science, Geoinformatics and Astronomy & Astrophysics. These post-graduate specializations uniquely combine practical, theoretical and computational work with prominence to research.

The research activity of the faculty in the department covers:

- Atmospheric Science
- Geology
- Remote Sensing
- Astronomy & Astrophysics

The Astronomy group of the Department is pursuing observational and theoretical work in diverse areas of Astrophysics including understanding the mechanism of Star Formation, the Physics of Compact Objects and the physical conditions of gas in galaxies and the Intergalactic medium.

The Atmospheric Science group in Earth System Science's Research thrust is to better understand Aerosol-Cloud Interaction and its subsequent effect in climate as well as to improve the prediction and enhance the understanding of weather systems through assimilation of satellite observations in regional mesoscale models.

The Geology Group in Earth System Science focuses on Planetary Geosciences, carrying out field and laboratory work on terrestrial sites that are close analogues of Lunar and Martian Terrains.

The Remote Sensing Group work on many areas including Synthetic Aperture Radar image processing for retrieving Geophysical Parameters, Geospatial Technologies for Coastal Zone Management, Image Restoration, Transform based Profilometry and 3-D shape extraction and also the development of Novel Image Classification Algorithms.

LABORATORY FACILITIES

Currently the Department possesses the following labs with state-of-the-art facilities.

- Astronomy lab
- Atmospheric Science Lab
- Geology Lab
- Remote Sensing Lab

FACULTY PROFILE (DEPT. OF EARTH AND SPACE SCIENCES)

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Area of Research: High Angular resolution astronomy, AGB stars and Mira variables, High mass star formation, Stellar population studies

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Area of Research: Numerical modeling of the atmosphere, data assimilation, mesoscale modeling, regional climate modeling

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Education : Ph.D., Pennsylvania State University, USA
Research Areas : Physical conditions of gas in galaxies and inter-galactic medium

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Education: Ph.D., M. S. Swaminathan Research Foundation, University of Madras
Area of Research: Application of Remote sensing and GIS technologies in Natural Resources management and special focus on Coastal Zone and Mangrove management

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Area of Research: NASA New Investigator Program, NOAA The Observing System Research and Predictability Experiment

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Area of Research: Image restoration, denoising, inpainting, stereo vision, particle filters, fluid flow estimation with Ensemble Kalman filters and its weighted variants, transform based profilometry and 3-D shape extraction

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Area of Research: Observational astronomy, High-mass star formation, Astrochemistry, Astronomical masers, Galactic Structure, Radio Astronomy Instrumentation

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Education: Ph.D., Yokohama National University, Japan
Area of Research: Planetary Geoscience, Minerology, Igneous Petrology, Geochemistry, Stable and Radio Active Isotopes, Geology, Geochronology

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Education: Ph.D., IISc, Bangalore
Area of Research: High Energy Astrophysics, Radiation processes in astrophysical contexts, Relativistic sources, X-ray and gamma-ray astronomy

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Education: Ph.D., IIT, Roorkee
Area of Research: Hyperspectral Remote Sensing, Integrated Assessment Modelling (Forest and Agro-ecological Systems), Rapid Remote Sensing (UAV borne), Spectral Library Search Methods, digital image processing, reflectance spectroscopy

Ramiya A. M.
Reader
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Education: M.S., University of Southampton, UK
Area of Research: LiDAR Remote sensing, Atmospheric Correction, Object Oriented Classification, Sub Pixel Classification, Hyperspectral Remote Sensing

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Education: Ph.D. Indian Centre for Space Physics, Kolkata
Area of Research: Accretion physics; studies of radiation spectrum of galactic as well as extra-galactic black hole systems; Gamma ray bursts; Background simulation for X-ray detectors

Sarita Vig
Associate Professor
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Education: Ph.D., Tata Institute of Fundamental Research, India
Area of Research: Star formation, Embedded Galactic clusters associated with massive stars, Interstellar medium, Galactic structure, Complex molecules in star forming regions

Venkata Ramana M.
Associate Professor
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Fax : 0471-2568406
Education: Ph.D. (from Space Physics Laboratory, VSSC) awarded by M.G. University, Kottayam
Area of Research: Aerosol-Radiation-Cloud-Climate; Atmospheric Boundary Layer; Climate Change; Unmanned Aircraft Vehicle (UAV) as research platform; miniaturized instrumentation

CURRICULUM (DEPT. OF EARTH AND SPACE SCIENCES)

B.TECH. IN PHYSICAL SCIENCES

SEMESTER I (22 CREDITS)

Code	Course Title
MA111	Calculus
PH111	Physics I
CH111	Chemistry
AE111	Introduction to Aerospace Eng.
AV111	Basic Electrical Engineering
PH131	Physics Lab I
Ae131	Basic Engineering Lab

SEMESTER II (20 CREDITS)

Code	Course Title
MA121	Vector Calculus and Differential Equations
MA122	Computer Programming & Applications
PH121	Physics II
CH121	Materials Science & Metallurgy
AV121	Basic Electronics Engineering
AE141	Engineering Graphics
Av141	Basic Electrical and Electronics Engineering Lab
CH141	Chemistry Lab

SEMESTER III (20 CREDITS)

Code	Course Title
MA211	Linear Algebra, Numerical Analysis and Transforms
PH211	Electrodynamics & Special Relativity
PH212	Mathematical Physics
AE215	Thermodynamic
AV215	Signal & Systems
HS211	Introduction to Economics
PH231	Optics Lab I

SEMESTER IV (21 CREDITS)

Code	Course Title
MA221	Partial Differential Equations, Calculus of Variations and Complex Analysis
PH221	Optics
PH222	Classical Mechanics
ES221	Earth System Science
Av225	Measurements and Instrumentation
HS221	Introduction to Social Science & Ethics
PH241	Optics Lab
ES241	Earth System Science Lab
AV245	Measurements and Instrumentation Lab

SEMESTER V (20 CREDITS)

Code	Course Title
MA311	Probability and Statistics
PH311	Quantum Mechanics
ES311	Atmospheric and Ocean Sciences
ES312	Introduction to Astronomy and Astrophysics
AV311	Digital Signal Processing
CH311	Environmental Science and Engineering
Ph331	Computational Physics Lab
AV331	Digital Signal Processing Lab

SEMESTER VI (23 CREDITS)

Code	Course Title
PH321	Statistical Mechanics
Ph322	Atomic, Molecular and Nuclear Physics
ES322	Pattern Recognition
ES323	Introduction to Space Vehicles
E01	Elective I
E02	Elective II
E03	Elective III
PH341	Modern Physics Lab
ES341	Astronomy Lab

SEMESTER VII (21 CREDITS)

Code	Course Title
Hs411	Principles of Management Systems
E04	Elective IV
E05	Elective V
E06	Elective VI
I01	Institute Elective
ES431	Earth and Space Science Lab
ES451	Summer Internship and Training
ES452	Comprehensive Viva-Voce I

SEMESTER VIII (15 CREDITS)

Code	Course Title
ES453	Comprehensive Viva-Voce
ES454	Project Work

Elective Courses

Sl.No	Course Code	Course Title	Earth System Science	Astrophysics and Planetary Sciences	Remote Sensing
1	Es461	Atmospheric Structure, Dynamics and Air-SeaInteraction	Yes	N/A	N/A
2	Es462	Solid Earth and its Dynamics	Yes	N/A	N/A
3	Es463	Biosphere and Hydrosphere	Yes	N/A	N/A
4	Es464	Gas Dynamics	Yes	Yes	N/A
5	Es465	Numerical Weather Prediction and Modeling	Yes	N/A	N/A
6	Es466	Earth Observation from Space	Yes	N/A	N/A
7	Es467	Solar Terrestrial Relations	Yes	N/A	N/A
8	Es468	Estimation and Stochastic Process	Yes	Yes	Yes
9	Es469	Astronomical Techniques	N/A	Yes	N/A
10	Es470	Radiation Process in Astrophysics	N/A	Yes	N/A
11	Es471	Structure and Evolution of Stars	N/A	Yes	N/A
12	Es472	Cosmology and Astro Biology	N/A	Yes	N/A
13	Es473	Diffused Matter in Space	N/A	Yes	N/A
14	Es474	High Energy Astrophysics	N/A	Yes	N/A
15	Es475	Galaxies (Structure, Dynamics and Evolution)	N/A	Yes	N/A
16	Es476	Solar System Science	N/A	Yes	N/A
17	Es477	Image Interpretation and Digital Image Processing	N/A	N/A	Yes
18	Es478	Optical Sensors	N/A	N/A	Yes
19	Es479	Geographic Information System	N/A	N/A	Yes
20	Es480	Introduction to Photogrammetry	N/A	N/A	Yes
21	Es481	Microwave Remote Sensing	N/A	N/A	Yes
22	Es482	Cartography and Navigation	N/A	N/A	Yes
23	Es483	Data Archival and Mining	N/A	N/A	Yes
24	Es484	Quantitative Methods in Remote Sensing	N/A	N/A	Yes
25	Es485	Physics of Stars	N/A	Yes	N/A
26	Es486	Planetary Geosciences	Yes	N/A	N/A
27	Es487	LIDAR Remote Sensing	N/A	N/A	Yes
28	Es488	Climate Change	Yes	N/A	N/A
29	Es489	Tropical Meteorology	Yes	N/A	N/A
30	Es490	Universe in a Nutshell	N/A	Yes	N/A
31	Es491	Introduction to Planetary Geoscience	N/A	Yes	N/A
32	Es492	Processing of Satellite Remote Sensing Data	N/A	N/A	Yes
33	Es493	Hyperspectral Remote Sensing	N/A	N/A	Yes
34	Es494	General Relativity and Cosmology	N/A	Yes	N/A

M.TECH. IN EARTH SYSTEM SCIENCES

SEMESTER I (17 CREDITS)

Code	Course Title
ESE611	Physical and Dynamic Meteorology
ESE612	Physical and Dynamical Oceanography
ESE613	Earth Resources and Tectonic Systems
ESE614	Atmospheric Radiation and Climate
ESE615	General Circulation and Monsoon
ESE631	Observational Techniques Lab I
ESE632	Earth System Science Lab II

SEMESTER II (21CREDITS)

Code	Course Title
E01	Elective I
E02	Elective II
E03	Elective III
E04	Elective IV
E05	Elective V
ESE641	Elective Lab I
ESE642	Elective Lab II
ESE651	Seminar – I
ESE652	Comprehensive Viva

SEMESTER III (14 CREDITS)

Code	Course Title
ESE653	Self Study & Seminar
ESE654	Project Work – Phase I

SEMESTER IV (18 CREDITS)

Code	Course Title
ESE655	Project Work – Phase II

Elective Courses

Sl No.	Code	Course Title
1	ESE461	Numerical Weather Prediction
2	ESE462	Planetary Geosciences
3	ESE463	Aerosol Cloud-Climate Interaction
4	ESE464	Air-Sea Interaction
5	ESE465	Satellite Meteorology and Oceanography
6	ESE466	Boundary Layer Meteorology
7	ESE467	Polar Science

M.TECH. IN GEOINFORMATICS

SEMESTER I (20 CREDITS)

Code	Course Title
ESG611	Introduction to Remote Sensing
ESG612	Geographic Information System
ESG613	Satellite based Navigation and Positioning
MA612	Applied Statistics
MA613	Data Mining
ESG631	Remote Sensing Lab
ESG632	Geographic Information System Lab
Ma632	Software Lab I

SEMESTER II (17CREDITS)

Code	Course Title
ESG621	Image Interpretation and Digital Image Processing
ESG622	Analysis and Modelling of Geospatial Data
ESG623	Microwave Remote Sensing
E01	Elective – 1
E02	Elective – 2
ESG641	Digital Image Processing Lab
ESG642	Microwave Remote Sensing Lab

SEMESTER III (16 CREDITS)		SEMESTER IV (19 CREDITS)	
Code	**Course Title**	**Code**	**Course Title**
E03	Elective – 3	ESG653	Dissertation – Phase II
ESG651	Dissertation – Phase I	ESG654	Seminar – II
ESG652	Seminar I		

Elective Courses

Sl No.	Code	Courses
1	ESG661	Advanced GIS(GIS related course)
2	ESG662	Pattern Recognition (interdisciplinary course)
3	ESG663	Quantitative Methods in Remote Sensing (application oriented remote sensing course)
4	ESG664	Photogrammetry (analog and digital photogrammetry course)
5	ESG665	Hyperspectral Image Processing and Analysis (satellite image analyses course)
6	ESG666	LIDAR Remote Sensing (GIS related course)

M.S. IN ASTRONOMY AND ASTROPHYSICS

SEMESTER I (16 CREDITS)		SEMESTER II (17 CREDITS)	
Code	**Course Title**	**Code**	**Course Title**
ESA611	Introduction to Astronomy and Astrophysics	ESA621	Structure & Evolution of Stars
ESA612	Astronomical Techniques	ESA622	Galaxies (Structure, Dynamics & Evolution
ESA613	Radiation Processes in Physics	E01	Elective I
ESA614	Computational Astrophysics	E02	Elective II
ESA631	Data Analysis Astronomy Lab	ESA641	Observational Astronomy Lab
ESA615	Planetary Sciences	ESA651	Seminar
		ESA652	Comprehensive Viva - Voce

SEMESTER III (19 CREDITS)		SEMESTER IV (18 CREDITS)	
Code	**Course Title**	**Code**	**Course Title**
ESA653	Self-Study Elective with Seminar	ESA655	Thesis -Phase II (Continuous assessment, Report, Seminar, Mid-Term and endterm)
ESA654	Thesis -Phase I (Continuous assessment, Report, Seminar, Mid-Term and end term)		

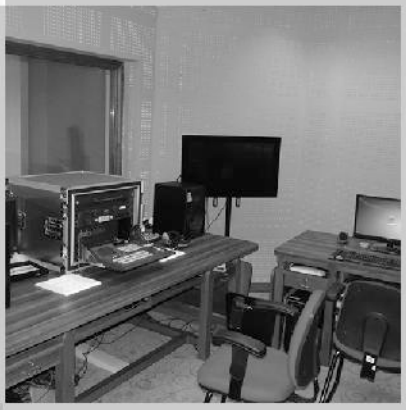
Elective courses

Sl. No.	Code	Course Title
1.	ESA661	Gas Dynamics
2.	ESA662	Physics of Interstellar & Inter-galastic medium
3.	ESA663	High Energy Astrophysics

4.	ESA664	Estimation and Stochastic Processes
5.	ESA665	Formation of Stars and Planets
6.	ESA666	Advanced Astronomical Imaging
7.	ESA667	Radiation Hydrodynamics
8.	ESA668	Accretion Physics
9.	ESA669	High Redshift Universe
10.	ESA670	Polarization in Astronomy
11.	ESA671	High Resolution Spectroscopy
12.	ESA672	Time Domain Astronomy
13.	ESA673	Exoplanets & Astrobiology
14.	ESA674	Physics of the Sun


Government of India
Department of Space
Indian Institute of Space Science


Patience-
Patient-



DEPARTMENT OF HUMANITIES

The Department of Humanities firmly believes in developing interpersonal communication between teachers and students as well as creating an environment that will synergistically link scientific developments and thoughts to enhance the socio-economic, linguistic, managerial and humanistic development of the country. It aims to build communication and managerial skills and also develop an awareness regarding various issues concerning society thus bringing in an all-encompassing and holistic development of the students.

Communication exercises have been introduced into the curriculum which covers visual, oral and written communication that ensures mirror expectations and best practices which make them stand uniquely and approachable any time. The study of Humanities at IIST also intend to enrich the engineering students to open up their mind for understanding the human, ethical and socio-economic problems faced by the country and the world, at large.

A solid grounding in the Humanities tends to expand individual consciousness, creating better human beings capable of managing difficult situations. Whether politically conservative, liberal, or independent, the study of Humanities leads the students to the development of thought and catapults one's understanding of why things are the way they are and how to successfully communicate or express his thoughts in the proper degree.

The Department instills the importance of responsible and sensitive global citizenship, through cultural self-reflection, ethical reasoning and historical understanding of one's relevance and positioning at the certain chronological axis of history. The Department of Humanities, empower young scientists, thinkers, and students with historical, social, economic and cultural thinking, impart communication and management skills to help them become good Indian citizens to serve the country and live a life rich in high intellectual acumen.

The doctoral program which the department offers in Economics, English, Management and Sociology is also highly sought after by students from all over the country.

The Department of Humanities plays a major role in the outreach programmes of the institute. It act as a liasoning body between the society and the institute. The department believe that youth is the time that epitomizes involvement, volunteerism and creative contribution. It would help students design activities that would enliven the campus as well as contribute to personality development. While the department intends to harness the innate potential and channelize the unspent energies and infuse more student initiatives on campus it would also help the students to contribute significantly to the society. The department thus intends to mould a group of men and women for others.

IIST@Schools is one such regular program of the department. This Workshop was intended for students of the VIII and IX Std. The objectives of the proposed workshop

were to bridge the perceptible gap between the pursuit of science and the fulfillment of societal needs and aspirations and to motivate and inspire the participants to look at science as way of life and to acquaint them with the achievements and challenges of the Indian Space Programme. The department has also adopted a neighboring village for community work – to test some models of development. The students are also trained in such a manner to help the people of the vicinity by developing their technical competency.

The Department has established an Audio Visual Lab in 2012-13. It is intended to create audio and video modules, study materials, to create content generation for lectures (both online and offline), documentaries, etc, by the faculty members, the students and the administrative fraternity of the institute. Following are few intended functional application areas where the studio will be utilized :

a. As a tool of Audio Visual Lab for Enhancing Communication Skills
b. Creating Content for various ISRO centres
c. Content Development and Materials Development for lectures
d. Recording of Interviews, talks of Dignitaries, etc.

LABORATORY FACILITIES (DEPT. OF HUMANITIES)

- Audio Visual Lab
- Language Lab

FACULTY PROFILE (DEPT. OF HUMANITIES)

Ravi. V
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Education: Ph.D., IIT, Delhi
Areas of Research: Reverse Logistics, Supply Chain Management, Operations Management, New Product Development, Quantitative Modeling, Multi-criteria decision making, etc., Heuristics for maximization of system reliability

Babitha Justin
Assistant Professor
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Education: Ph.D., University of Hyderabad
Area of Research: Post colonial and Women's Studies, Travel Writing and Photography, European Literature, Culture Studies, Visual Art and the Ontology of 20th Century English Poetry and Music, Studies in Indigenous Tribes and Cultures

Gigy J. Alex
Reader
Email: gigy@iist.ac.in, Phone (Off): 0471-2568445, Fax : 0471-2568406
Education: Ph.D., Mahatma Gandhi University
Area of Research: Resistance Literature, Comparative Literature, Culture Studies, Genre and gender studies, Post Colonial Writing, Indian English literature, Science Fiction, Black American and Native American Literature

Lekshmi V. Nair
Associate Professor
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Education: Ph.D., University of Kerala
Area of Research: Gerontology, Social Research, Gender Studies, PLA, Science Technology and Society

Shaijumon C. S.
Assistant Professor
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Education: Ph. D., University of Kerala
Area of Research (Economics): Technology, innovation and economic development, Space Economics, Indian economics, Development economics, Agricultural Issues, International trade, WTO and Globalization issues, Infrastructure, Governance and Regional economics

DEPARTMENT OF MATHEMATICS

The Department of Mathematics was started in the year 2007, at the inception of IIST.

The Department offers courses at Undergraduate, Post Graduate and Doctoral levels. At the Undergraduate level, five papers are offered as core courses and three as Institute Electives for all the three B.Tech Programmes.

A two year M.Tech programme in Machine Learning and Computing is being offered by the Department. A Mathematics core paper is included in the course work of the Ph.D programme across the Science and Engineering Departments. There are six full-time and one part-time research scholars in the Department.

At present, there are eleven faculty members, working in the following research areas:

- Mathematical Theory of Control, Functional Analysis, Soft Computing
- Suspension Rheology and Time Series Analysis
- Partial Differential Equations
- Differential Geometry and Applications
- Stochastic Modelling and Analysis
- Computational Fluid Dynamics
- Finite Element Method
- Numerical Analysis
- Commutative Algebra
- Machine Learning, Data Mining, Bioinformatics, Signal Procesisng
- Stochastic Process and Differential Equations, Control Theory

LABORATORY FACILITIES

1. Programming Lab
2. High Performance Computing Lab
   - 10 High-End Work Stations
   - Quad Core Processor with 72 GB RAM, 4GB NVIDIA Graphic Card Memory and 30 inch LCD Monitor

FACULTY PROFILE (DEPT. OF MATHEMATICS)

Subrahamanian Moosath K. S.
Head & Associate Professor
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Education: Ph.D., University of Hyderabad
Area of Research: Differential Geometry and Applications

Raju K. George
Dean (Student Welfare), Sr. Professor
Email: rkg.iist@gmail.com, Phone(Off): 0471- 2568504, Fax: 0471-2568406
Education: Ph.D., IIT, Bombay
Area of Research: Functional Analysis, Mathematical Control Theory, Soft Computing, Industrial Mathematics

Anil Kumar C. V
Associate Professor
Email: anil@iist.ac.in, Phone (Off): 0471- 2568511, Fax: 0471-2568406
Education: Ph.D., CUSAT, Cochin
Area of Research: Suspension Rhelogy., Time series analysis

Deepak T. G.
Associate Professor
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Education: Ph.D., CUSAT, Cochin
Area of Research: Stochastic Modelling: Queueing Theory queuing network models

Kaushik Mukherjee
Assistant Professor
Email: kaushik@iist.ac.in, Phone(Off): 0471-2568517, Fax: 0471-2568406
Education: Ph.D., IIT Guwahati
Area of Research: Finite Difference and Finite Element methods for Singularly Perturbed Problems, Numerical Techniques for Parabolic PDEs, Multi-Scale Problems

Natarajan E.
Assistant Professor
Email: thanndavam@iist.ac.in, Phone (Off): 0471-2568515, Fax: 0471-2568406
Education: Ph.D., IIT, Chennai
Area of Research: Finite element methods, Computational fluid dynamics, Recent interest includes higher order FEM and compact difference schemes

Prosenjit Das
Assistant Professor
Email: prosenjit.das@iist.ac.in, Phone(Off): 0471-2568517, Fax: 0471-2568406
Education: Ph.D., Indian Statistical Institute, Kolkata
Area of Research: Epimorphism problems, Cancellation problems, Affine forms, Affine fibrations, Locally Nilpotent Derivations and allied areas

Sakthivel Kumarasamy
Inspire Faculty
Email: sakthivel@iist.ac.in, Phone(Off): 0471-2568515, Fax: 0471-2568406
Education: Ph.D., Bharathiar University, Coimbatore
Area of research: Partial Differential Equation, Stochastic Processes and Differential Equations, Search and Detection, Control Theory, Inverse Problems, Fluid Dynamics

Sabu N.
Associate Professor
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Education: Ph.D., Institute of Mathematical Sciences, Chennai
Area of Research: Partial Differential Equations, Homogenization, Finite Element Method

Sarvesh Kumar
Assistant Professor
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Education: Ph.D., IIT, Bombay
Area of Research: Computational Partial Differential Equations, Finite Volume Element Methods, Finite Element Methods, Discontinuous Galerkin Methods

Sumitra S. Nair
Assistant Professor
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Education Ph.D., The University of Sheffield, UK.
Area of Research: Machine Learning, Data Mining, Bioinformatics, Chemoinformatics, Signal Processing

CURRICULUM (DEPT. OF MATHEMATICS)

M.TECH. IN MACHINE LEARNING AND COMPUTING

SEMESTER I (19 CREDITS)

Code	Course Title
MA611	Optimization Techniques
MA612	Applied Statistics
MA613	Data Mining
MA614	Matrix Computation
Ma616	Evolutionary and Natural Computing
Ma631	Software Lab 1

SEMESTER II (19CREDITS)

Code	Course Title
MA621	Discrete Mathematics
MA622	Pattern Recognition and Machine Learning
Ma623	Computer Modeling and Simulation
E01	Elective – I
E02	Elective – II
Ma641	Software Lab II

SEMESTER III (14 CREDITS)

Code	Course Title
MA851	Seminar
MA711	Self Study Course
MA712	Comprehensive Viva
Ma852	Project Work – Phase I

SEMESTER IV (18 CREDITS)

Code	Course Title
Ma853	Project Work – Phase II

Elective Courses

Sl No.	Code	Course Title
1	MA861	Computer Vision and Image Processing
2	MA862	Artificial Neural Networks
3	MA863	Stochastic Differential Equations
4	MA864	Machine Learning for Control
5	MA865	Fuzzy Sets and Applications
6	MA866	Control Theory
7	MA867	Reinforcement Learning
8	MA868	Scientific Computing
9	MA869	Computational Optimization

DEPARTMENT OF PHYSICS

The Department of Physics at IIST was started in September 2007. The Department offers as many as seven courses in the First year of B.Tech.(Physical Sciences) apart from two compulsory Physics Courses in the first year of B.Tech. and a two year M.Tech Programmes in Optical Engineering and in Solid State Technology and also Ph.D. Programme in various branches of Physics.

From the academic year 2012-2013 onwards, the Department of Physics has started two year (4 semester) full time M.Tech course in Optical Engineering and from the academic year 2013-2014, the Department started two year full time M.Tech course in Solid State Technology.

Apart from delivering world-class teaching guidance and imparting basic and applied Physics Concepts to both the undergraduates and Post-graduates, through theory and experiments, the main vision and goal of the Department is to contribute to the knowledge driven Development and Technology in fundamental and Applied Physics for Space Science and Technology.

The faculties of Physics Department specialize in

- Applied Optics
- Adaptive Optics
- Classical Optics
- Non-Linear Optics
- Lasers and Photonics
- Solid State Physics
- Atomic and Molecular Physics
- Theoretical Physics (Non-linear dynamics, Statistical Mechanics)

LABORATORY FACILITIES

- Adaptive Optics Lab
- Atomic and Molecular Physics Lab
- Lasers and Photonics Lab
- Modern Physics Lab
- General Physics Lab
- Optics Lab
- Solid State Physics lab
- Computational Physics Lab

FACULTY PROFILE (DEPT. OF PHYSICS)

Murugesh S.
Head & Associate Professor
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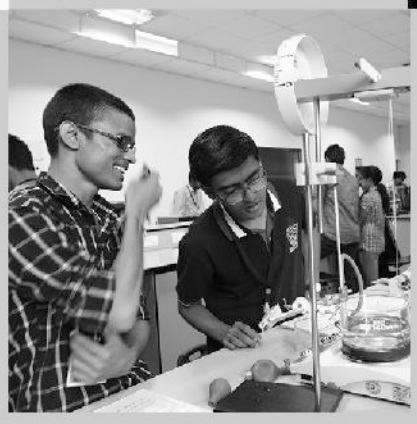
Education: Ph.D., Institute of Mathematical Sciences, Chennai
Area of Research: Nonlinear Dynamics & applications to condensed matter systems, Geometry & integrability, Solitons in condensed matter physics



Apoorva Nagar
Assistant Professor
Email: apoorva.nagar@iist.ac.in, Phone(Off): 0471-2568545, Fax : 0471-2568542
Education: Ph.D., TIFR, Mumbai
Area of Research: Nonequilibration statistical Mechanics, Biological Physics

Jayanthi. S
Assistant Professor
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Education: Ph.D., IISc, Bangalore
Area of Research: Nuclear Magnetic Resonance

Jinesh K B
Assistant Professor
Email: kbjinesh@iist.ac.in, Phone(Off): 0471-2568523, Fax : 0471-2568542
Education: Ph.D., Leiden University, Netherlands
Area of Research: Nano Electronics, Semiconducting/High-K materials for advanced CMOS technology, Solar and photo voltaic materials

Kuntala Bhattacharjee
Assistant Professor
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Education: Ph.D., Institute of Physics, Bhubaneswar.
Area of Research: Semiconductor, metal nanostructures. Self-assembly by molecular beam epitaxy (MBE). Various scanning probe techniques. Study of low dimensional structures by scanning tunneling microscopy (STM) and scanning tunneling spectroscopy (STS).

Narayanamurthy C. S.
Sr. Professor
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Education: Ph.D., IIT, Madras
Area of Research: Holography, Optical coherence, Non-linear photorefractive optics, Optical testing, Interferometry, Electromagnetic theory, Adaptive optics (optical imaging through turbulance medium)

Naveen Surendran
Assistant Professor
Email: naveen.surendran@iist.ac.in, Phone(Off): 0471-2568546, Fax: 0471-2568542
Education: Ph.D., Institute of Mathematical Sciences, Chennai
Area of Research: Condensed matter theory: quantum spin systems, topological order, effects of frustration, quantum dynamics

Pramod Gopinath
Assistant Professor
Email: pramod@iist.ac.in, Phone(Off): 0471-2568552, Fax: 0471-2568542
Education: Ph.D., CUSAT, Cochin
Areas of Research: Laser Produced Plasmas, Emission Spectroscopy, Nonlinear Optics

Rakesh Kumar Singh
Assistant Professor
Email: krakeshsingh@iist.ac.in, Phone(Off): 0471-2568546, Fax: 0471-2568542
Education: Ph.D., IIT, Delhi
Areas of Research interest: Singular optics (optical vortex), High numerical aperture focusing, Speckle, Polarization imaging Coherence & Stokes Holography

Solomon Ivan J.
Assistant Professor
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Education: Ph.D., Institute of Mathematical Sciences, Chennai
Areas of Research interest: Quantum Information Theory, Quantum Optics, Classical Optics

Sudheesh C.
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Education: Ph.D., IIT, Chennai
Area of Research: Theoretical Physics, Nonlinear Dynamics, Chaos, Quantum Information, Quantum Optics, Quantum Decoherence

Umesh R. Kadhane
Associate Professor
Email: umeshk@iist.ac.in, Phone(Off): 0471-2568550, Fax: 0471-2568542
Education: Ph.D., TIFR, Mumbai
Area of Research: Atomic and Molecular Physics

CURRICULUM (DEPT. OF MATHEMATICS)

M.TECH. IN SOLID STATE TECHNOLOGY

SEMESTER I (18 CREDITS)

Code	Course Title
PH615	Advanced Electro Magnetics
Ph616	Statistical and Semi Conductor Physics
PH617	Solid State Physics
PH618	Applied Quantum Physics
PH633	Solid State Technology

SEMESTER II (17 CREDITS)

Code	Course Title
PH625	Solid State Physics II
Ph626	Physics & Nano- Electronics Device
E01	Elective 1
PH653	Seminar
PH636	SST Lab II
Ph656	Comprehensive Viva

SEMESTER III (18 CREDITS)

Code	Course Title
PH755	Project Work – Phase I
PH756	Seminar II

SEMESTER IV (20 CREDITS)

Code	Course Title
PH757	Project Work-Phase II

Elective Courses

Sl No:	Code	Course Title
1	PH669	Laser Applications
2	PH687	VLSI Process Technology & Integration
3	PH688	Optoelectronics
4	PH689	Semiconductor Heterostructures and Applications
5	PH691	Semiconductor Devices in Radiation Detection and Sensor Applications
6	PH693	Analog and Digital Signal Processing of Fast Electronic Pulses
7	PH694	Electric and Magnetic Properties of Materials
8	PH695	Thin Films: Physics and Technology
9	PH700	Semiconductor Devices modeling
10	PH701	Experimental Techniques in Solid State Technology
11	PH702	Advanced Memory Technologies
12	PH703	MEMS & MOEMS
13	PH704	Renewal Energy Technology
14	PH705	Quantum Information

M.TECH. IN OPTICAL ENGINEERING

SEMESTER I (17 CREDITS)

Code	Course Title
Ph611	Optical Engineering Fundamentals
PH612	Opto-Mechanical Design Analysis
Ph613	Optical Fabrication and Testing
PH614	Lasers and Optoelectronics
PH619	Fourier Optics
PH631	Optics and Optoelectronics Lab
PH 632	Design and Analysis Lab

SEMESTER II (18 CREDITS)

Code	Course Title
PH621	Guided Wave Optics
PH622	Adaptive Optics
PH623	Optical System Analysis and Design
E01	Elective I
E02	Elective II
PH641	Guided Wave Optics Lab
PH642	Adaptive Optics Lab
PH651	Seminar

SEMESTER III (15 CREDITS)

Code	Course Title
Ph751	Project Work – Phase 1
PH752	Comprehensive Viva

SEMESTER IV (20 CREDITS)

Code	Course Title
PH754	Project Work – Phase II

Elective Courses

Sl No.	Code	Course Title
1	PH661	Optical Thin Films Science and Technology
2	PH662	Optical and Electro Optical Sensors
3	PH663	Integrated Optics
4	PH664	Optical Communication
5	PH665	Advanced Optoelectronics
6	PH666	Statistical and Quantum Optics
7	PH667	Nonlinear Optics
8	PH668	MEMS & MOEMS
9	PH669	Laser Applications
10	PH670	Quantum Optical Communication
11	PH671	Nano Optics

STUDENT ACTIVITIES

MAIN INTER-DISCIPLINARY STUDENT PROJECTS

Students and Faculty at IIST get-together and work closely with ISRO scientists currently on two major areas:

• Vyom Mk II - Sounding Rocket Project

IIST has taken up the design of Vyom Mk II sounding rocket after successful launch of the Vyom-I rocket on May 11, 2012. Vyom-II aims at doubling the payload capability to 20 kg and increasing the peak altitude from 14 km to 70 km. The main challenge is to do this while maintaining the simplicity and reliability of a single stage rocket.

A novel aspect of the current effort is to design this rocket using MDO (Multi-Disciplinary Design Optimization), where the disciplines of Aerodynamics, Solid Motor Propulsion, Structural Analysis and Flight Mechanics are optimized together to get an optimal vehicle design.

This work involves lot of interaction with practicing Scientists and Engineers of ISRO who act as guides in specific disciplines. In addition to getting wide experience in the disciplines involved in rocket design, the students and faculty of IIST carry out research in specific disciplines and the system design leading to publications in reputed journals. They also present this work in leading national and international conferences.

• Nano-Satellite Project

IIST nano-satellite mission is an interdisciplinary project taken up by a team of IIST students with mentor-ship provided by ISRO scientists and IIST Faculties. The mission's objective is to set a small-satellite standard for the Indian education institutes and for the students to have a hands-on experience on the design, fabrication and realization of small satellites at reasonable cost. TheIIST nano-satellite mission began in the year 2008 and is in an advanced stage of development now. During this period it has helped our students in complementing their domain knowledge acquired from the curriculum in various disciplines like computer science, power systems, control theory, communication, PCB design etc.

CLUBS AT IIST

The major clubs functioning at IIST are

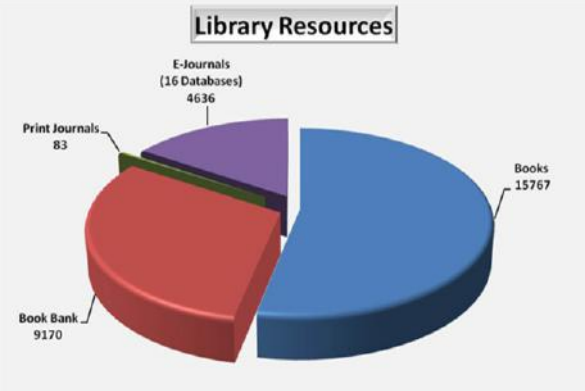
- Aeroclub Activities
- Music Club
- Dance Club
- Quiz Club
- Photography Club
- Performance and Digital Arts Club
- Food for Thought Forum
- Panacea – Club for Outreach Activities
- Aero Club
- Robotic Club
- Eco Club
- Astronomy Club

LIBRARY

The Library at IIST, housed in a six storey building, in beautiful surroundings on an elevated site at the centre of the Campus, offers a congenial environment for study and research functions. It offers access to the teaching and student community. The Library which acts as a learning resource centre for teaching and research programmes is well equipped with learning resources, services and supporting infrastructure facilities. Most of the library services are being delivered through an integrated library portal in an automated environment. The total collection of the library well exceeds 26637 books. A balanced collection of books, journals and e-resources cover all major subject areas.

The Library Software has provision for making online suggestion for books/journals. The collection is based on the survey from Faculty and Students, under the guidance of Library Committee with representatives' drawn from all Departments and all sections of the students.

E-resources deployed in the Campus-wide network contains more than 4500 e-journals, hundreds of conference papers, standards, etc. The major e-resources are ACM Digital Library, AIAA, AIP, APS, Annual Reviews, ASME, AMS, Cambridge Online, IEL Online, Oxford Journals Online, Science Direct, Royal Society of Chemistry, OPTIC INFOBASE.



1. Textbook Bank.
   The collection in the Book Bank is adequate to ensure that at least one textbook per course per student on loan for every semester.
2. Inter-Library Loan.
   Inter-Library Loan is arranged on request from VSSC and other ISRO Libraries.
3. Online Public Access Catalogue. (OPAC)
   An online catalogue of IIST Library deployed over the intranet. It's a finding tool, with many advanced features such as Boolean Search. Availability of a book can be checked in terms of the author, title, or dealing subject of the book.
4. Reprographic Facility.
5. Graphic Design Facility.
6. Central Binding Facility.

FACILITIES AT IIST

COMPUTER SYSTEMS GROUP (CSG) AT IIST

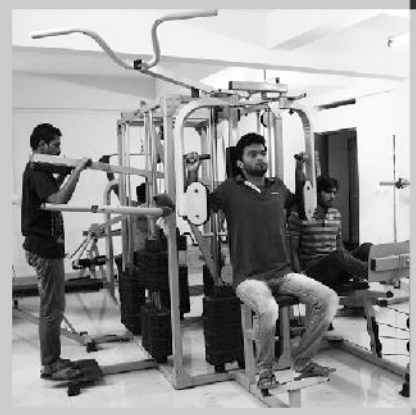
Computer Systems Group has set-up infrastructure for computing, networking, tele-communication, multi-media services and security-surveillance in IIST. In-house capabilities have been developed to undertake uninterrupted operation and routine maintenance of these to ensure 24*7 availability of various information systems and network services in the campus. It caters to the routine needs of more than 1500 students and staff-members having 1800 personal computers and mobile devices distributed amongst 20 buildings across the Campus. About 1100 "Bring-Your-Own-Devices" (BYOD), like laptop, tablet and smart-phone computers, owned mostly by the students, are facilitated roaming wireless internet services in all hostels and academic blocks on round-the-clock-basis. About 100 workstations installed with various scientific and engineering software are maintained in the laboratories and academic blocks. CSG also maintains a 24-seat Internet Laboratory as a common-facility for use by students in the Academic blocks, a 4-seat internet facility in the 1st year Undergraduates Hostel and 2-seat facility in the 1st year Lady Undergraduates Hostel.

KEY FEATURES OF CSG AT IIST

1. Computing Facility: High performance cluster server having 3 Terra flop speed (32 HP Blade servers having 64 Dual Quad Processor). Storage – 1.20 TB SAN Storage with NAS Header. Tape Library with Back-up Software.
2. Campus Automation Servers: 8 Servers with 4CPU/Dual CPU High Performance.
3. Computing Lab: High-end Work Stations (Quad Core Processor with 72 GB RAM, 4 GB NVIDIA Graphic Card Memory and 30 inch LCD Monitor) installed with several advanced engineering and scientific software.
4. A programming lab for undergraduate students with 64 desktop computers and digital printers.
5. An internet lab for the use of undergraduate students with desktop computers and digital printers.

IIST HOSTELS

Eleven hostels functioning in the campus, built based on contemporary architecture cater to the residential accommodation of students. Each of the hostel-block has well-ventilated rooms designed to accommodate students on single and double-occupancy basis. There are separate hostels for B.Tech, M.Tech. and Research Scholars and around 800+ students reside in the campus . Each hostel has provision of safe drinking water with hot and cold water dispensers, 24 hrs uninterrupted power supply, housekeeping services, Wi-Fi internet facility, reading room with national and vernacular newspapers, indoor games facility, LCD television with satellite connection etc. and centralized gym facility with modern fitness equipments and laundry service provider.



OTHER FACILITIES

* Two well equipped canteens giving prime importance to health and hygiene provide food to the students. There are separate canteens and counters for food of faculty members and staff.

* A private cafeteria provides vegetarian and non vegetarian food to all till extended times.

* A stationery shop with essential commodities for students also functions as part of the cafeteria.

* Medical facilities consists of a well equipped and round-the-clock Medical Centre with doctors and paramedical staff within the campus. It is well stocked with necessary medicines. A tie up also exists with one of the leading hospitals in the vicinity to provide medical services to the students. Accident Insurance coverage is available to all the students through this hospital. A fully equipped ambulance is always available in the campus.

* Sports facilities include indoor and out door badminton courts, volley ball and basket ball courts, cricket practice nets within the campus. A playground has been set up in the Institute property earmarked for residential complex well within the reach of the students. Two Physical Education Instructors have been engaged to support the students with training The students are also supported to represent the institute in outside sports meets .

* Health facilities in the form of most modern equipments have been provided in the full fledged gymnasium along with the services of trained instructors.

* A private run book store functioning in the campus meets the needs of the students in utilizing the book grant of B. Tech. Students along with their regular needs.

* Banking facilities are provide by a branch of Union Bank of India with ATM facility in the campus.


GOVT. OF INDIA
KL 22
A 96


Union Bank
of India
ATM
VALIYAMALA

M.TECH. INTERNSHIP

Students pursuing their M.Tech. program at IIST are allowed to do short-term Internship/Long-Term Internship (6 months to one year) depending upon their course of study. In certain disciplines of M.Tech., Long-Term Internship (typically one year) could lead to M.Tech. Thesis work.

For M.Tech. Thesis work, a Joint Declaration is signed between the Company/R&D Institute and IIST agreeing on the following broad guidelines:

1. The student shall have a Supervisor from IIST in addition to the supervisor from the company/ R&D Institute. The topic suggested by the company shall be discussed with the Supervisor from IIST and also the same shall be ratified by the concerned department at IIST prior to commencement of the work.
2. The supervisor/Supervisor from the company/ R&D Institute and IIST may have timely discussions with regard to the progress of the work. The thesis carries credits and hence mode of interim evaluation and assessment of progress shall be agreed upon mutually by the Supervisors from IIST and from the company/ R&D Institute. The same shall be in line with the academic requirements stipulated by IIST as requirements for the M.Tech.- Thesis.
3. Many of the M.Tech. Progammes at IIST have course work in their third semester. If the course work is 'self study' in nature, students need to report to the department for Assignments, Review/Interaction/exams(quizzes and end semester exam) etc. The schedule for the same shall be worked out in consultation with the course coordinator / Department Heads.
4. The company shall discuss the nature of non-disclosure agreement that the student / Supervisor from IIST need to comply. The possibility of publication of the work and extent of information that may be incorporated in the Thesis submitted to IIST shall be discussed clearly in the consultation with Supervisor form IIST prior to the commencement of the work. If the company and IIST consider it important to protect the intellectual property arising in the M.Tech. Thesis work, they will apply for such protection together.

Internship/M.Tech. Thesis Record for the Year 2015

Sl No:	Name	Branch	Course	Internship	Duration
1	Abhilash Merin Mary	Avionics	VLSI & Microsystems	INTEL	One Year
2	Meyn Satish	Avionics	VLSI & Microsystems	INTEL	One Year
3	Verma Vandana	Avionics	VLSI & Microsystems	Analog Devices	One Year
4	Rajan	Avionics	DSP	INTEL and Analog Devices	One Year
5	Gayathri	Avionics	DSP	Analog Devices	One Year
6	Shreeja	Avionics	DSP	Analog Devices	One Year
7	Blessey	Avionics	DSP	Analog Devices	One Year
8	Vaisakh S	Mathematics	Machine Learning and Computing	INTEL	One Year
9	Shiyas Azeez	Mathematics	Machine Learning and Computing	INTEL	One Year
10	Nithin	Chemistry	Material Science and Technology	NFTDC	One Year

List of Companies Visited for Placement

Analog Devices
Gauge Data Solutions Pvt. Ltd.
KPIT Technologies Ltd.
Philips Innovation Campus
Sorokasoft India Private Limited
VizExperts LLC
COM DEV International Ltd.
Kottackal Business Solutions Pvt. Ltd.
Nonferrous Materials Technology Development Centre
QuEST Global Engineering Pvt. Ltd.
Team Indus
Indian Navy

List of M.Tech. Students who are Placed

Sl No:	Name	Branch	Course
1	Dig Vijay Pandey	Avionics	B.Tech
2	Mohan Kashyap	Mathematics	Machine Learning and Computing
3	Prasanna Kumar	Avionics	B.Tech
4	Praveen Vijayan	Mathematics	Machine Learning and Computing
5	Prem Kumar	Avionics	VLSI & Microsystems
6	Ravi Teja	Avionics	RF & Microwave
7	Rinku Wilson	Avionics	DSP
8	Sailesh Ganesan	Mathematics	Machine Learning and Computing
9	Sundara Bharati	ESS	Geoinformatics
10	Unni V.S.	Avionics	DSP

COMPANY REGISTRATION

A company/R&D/Management, registers with the Placement Cell, for the purpose of placement and internship, by providing the company details and the purpose.

Indian Institute of Space Science and Technology
Placement Cell

1. Name of the Company:
2. Website:
3. Address:
4. Contact Details

	Name	Designation	Mobile No:	Email ID
Contact Person 1				
Contact Person 2				
Contact Person 3				

5. **Purpose (Internship/Placement/Placement & Internship)**

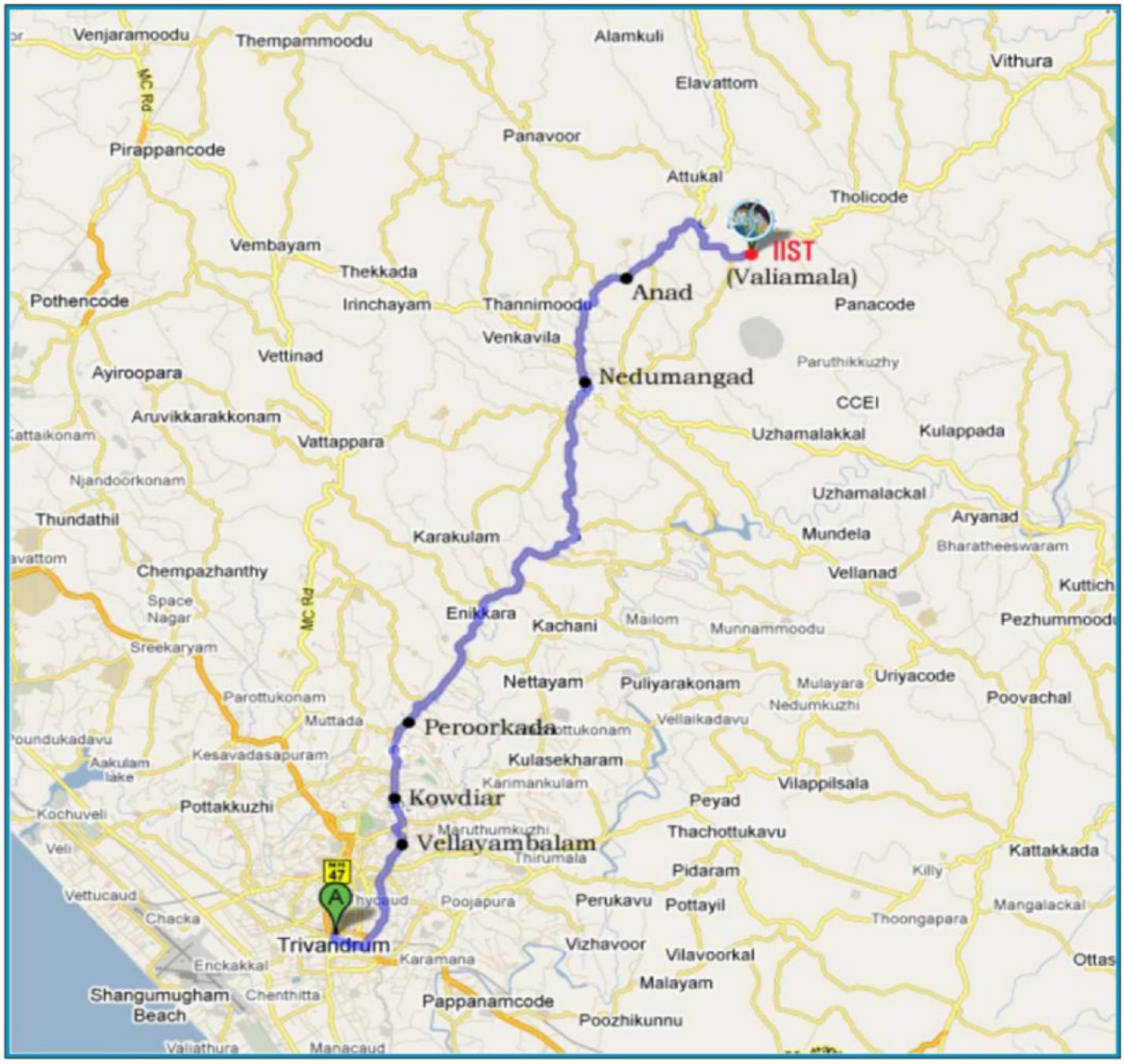
5.1 Placement ☐

M.Tech: Yes ☐ No ☐
B.Tech: Yes ☐ No ☐

5.2 Internship ☐

M.Tech: Yes ☐ No ☐
B.Tech: Yes ☐ No ☐

Kindly contact the Placement Cell at placement@iist.ac.in or call to 0471-2568606, if you find any difficulty with the registration procedure.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Vithura
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Pirappancode
Panavoor
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Tholicode
Vembayam
Thekkada
Pothencode
Irinchayam
Thannimoodu
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Uzhamalakkal
Kulappada
Vattappara
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PLACEMENT CELL

Indian Institute of Space Science and Technology

(Declared as Deemed to be University under Sec.3 of UGC Act 1956)

Valiamala P. O., Thiruvananthapuram- 695 547, Kerala

http://www.iist.ac.in/facilities/placement-office

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