



INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY

(Declared as Deemed to be University under section 3 of the UGC act 1956)
Thiruvananthapuram – 695547

IIST Ph.D. Programme – July 2020 Admissions

Indian Institute of Space Science and Technology envisions basic and applied research for meeting the national R&D requirements of Science and Technology in general and the Indian Space Programme in particular. The institute provides a vibrant research atmosphere and offers doctoral and post doctoral programmes.

Applications are invited from highly motivated applicants for admission to the Ph.D. Programme starting in July 2020, in the departments given below:-

- (i) Aerospace Engineering
- (ii) Avionics
- (iii) Chemistry
- (iv) Earth and Space sciences
- (v) Humanities
- (vi) Mathematics
- (vii) Physics

Eligibility

- 1. Nationality:** Applicant should be an Indian citizen.
- 2. Age Limit:** Applicant should be below 35 years as on 15.06.2020. Age relaxation is applicable as per Government Rules.
- 3. There is no provision for PhD admission in IIST under Self Financing Category.**

Minimum Qualifications:

1. Applicants with Master's Degree in Engineering/Technology as their highest qualifying degree

Applicants with Master's Degree in Engineering/Technology must have secured 65% marks or 7.00 CGPA on a scale of 10 or equivalent in the Qualifying Master's degree (60%marks or 6.50 CGPA on a scale of 10 for OBC / EWS, 55%marks or 6.00 CGPA on a scale of 10 for SC/ST/PD). **They must have pursued their Master's degree on the basis of qualified GATE score.** However there is no GATE cut off score for applicants with M.Tech./M.E as the highest qualifying degree, who are applying for Ph.D. in Engineering Discipline. Applicants with Master of Science in Engineering or equivalent

from leading foreign Universities with minimum CGPA 8/10 or 3.6 /4 or equivalent can be considered without GATE score.

Selection Procedure: For candidates with M.E/M.Tech.as their highest qualifying degree, selection to the PhD programme will be based on **online screening test** followed by an interview. **Interview will be conducted through Video Conference mode (Skype / Zoom).** However, candidates with a valid CSIR / NET-JRF or Lectureship post their ME/M.Tech, will be directly called for the interview **through Video Conference mode (Skype / Zoom).**

2. Applicants with Master's Degree in Science as their highest qualifying degree

Applicants must have Master's Degree in the relevant area with a minimum of 65% marks or 7.00 CGPA on a scale of 10 or equivalent in the Qualifying Master's degree (60%marks or 6.50 CGPA on a scale of 10 for OBC / EWS, 55%marks or 6.00 CGPA on a scale of 10 for SC/ST/PD). They must have cleared a National level eligibility test, such as a valid **UGC-CSIR-NET-JRF / Lectureship / fellowship or NBHM / JEST / GATE** and State Government Science and Technology Scheme, in the relevant disciplines.

Selection Procedure: For candidates applying with their Master's degree in Sciences as their qualifying degree and having a valid score card/certificate in any of the National level eligibility tests listed above, **selection to the programme will be based on an interview through Video Conference mode (Skype / Zoom).**

Applicants applying with their JEST score should have secured a rank within the first 300.

Candidates applying with a valid GATE score in a Science discipline, having a minimum score of 500 for General Category (450 for OBC / EWS and 350 for SC/ST/PD categories), are exempted from the Ph.D. online screening test conducted by IIST. Applicants having GATE score in Science disciplines less than indicated cut-off above will not be considered for Ph.D. Admission.

3. Applicants with Master's Degree in Humanities/Management/Social Sciences as their highest qualifying degree

Applicants must have Master's Degree in the relevant area of Humanities/Management / Social Sciences with a minimum of 65% marks or 7.00 CGPA on a scale of 10 or equivalent in the Qualifying Master's degree (60%marks or 6.50CGPA on a scale of 10 for OBC / EWS, 55%marks or 6.00 CGPA on a scale of 10 for SC/ST/PD). They must have cleared a national level eligibility test, such as a valid UGC-NET-JRF fellowship/State Government Science and Technology Scheme or similar fellowship schemes of Central/State Governments.

Selection Procedure: For candidates applying with their Master's degree in Humanities/Management/Social Sciences as their qualifying degree and having a valid

score card/certificate in any of the National level eligibility tests listed above, selection to the programme will be based on an interview to be conducted **through Video Conference mode (Skype / Zoom)**

4. Candidates who have been provided research fellowships by State Government Science and Technology Scheme/DST-INSPIRE etc, are eligible to apply If they have already cleared a National level eligibility test, such as a valid **UGC-CSIR-NET Lectureship or JEST/GATE**. A valid GATE score of minimum 500 for General Category (450 for OBC / EWS and 350 for SC/ST/PD categories) in a Science discipline or JEST rank within the first 300 is required.

5. Candidates awaiting results:

Candidates awaiting their results in the final year/semester are also eligible to apply, provided they satisfy all the other requirements. Such applicants may be screened in for online screening test/interview based on the marks obtained by them until the current year/semester. Based on their online screening test/interview performance, these applicants may be provisionally selected, subject to the condition that they have to produce the provisional certificate of obtaining the qualifying degree with required percentage of marks by the date stipulated in their provisional admission letter. If they fail to produce the provisional/ degree certificate, transfer certificate and conduct certificate by this date, their admission offer will be withdrawn and the offer may be given to next eligible applicant in the waiting list.

A provisionally selected applicant who is awaiting his/her final certificates may be allowed to join IIST without submitting the provisional/degree certificate on the stipulated date of joining, subject to the conditions that (a) At the time of joining the applicant should have completed all the requirements for the award of the qualifying degree including all examinations, project works and viva voce, (b) The applicant should produce at the time of joining, a Course Completion Certificate issued by the competent authority in the University/Institute specifically confirming that all examinations, project works and viva voce for the qualifying degree are completed, (c) If the above condition is satisfied, the applicant can be given provisional admission with the undertaking that all pending certificates, mark sheets, degree certificates (Original or Provisional) will be submitted to IIST , latest by **31st October 2020**, failing which the admission shall stand cancelled. For such applicants who are funded by IIST and provisionally admitted to the IIST Ph.D. Programme as per (c) above, no fellowship will be paid during the period before the required certificates are submitted. However, on regularization of admission following the submission of all required documents before the stipulated date, the applicant will be paid fellowship with retrospective effect from the date of joining.

Applicants who are employed in Government / Semi Government / PSUs / Autonomous Bodies should produce a “No Objection Certificate (NOC)” from the current employer at the time of Interview.

Applicants who hold External Fellowships, meeting Table 2 requirements, can also apply for research areas listed in Table 1 provided they meet the eligibility requirements.

**Table 1(Funded by IIST)
Research Areas for July 2020 PhD Admission**

Department of Aerospace Engineering			
Sl. No.	Department code	Research Area	Eligibility
1	PAE01	Computational Fluid Dynamics	M.Tech / ME/MS in Aerospace, Aeronautical, Mechanical Engineering or equivalent.
2	PAE02	Optimisation, Computational, Fluid dynamics, Hypersonics	
<p><u>Syllabus for screening test for PAE01 and PAE02</u></p> <ol style="list-style-type: none"> 1. Basic Engineering Mathematics 2. Fluid Mechanics (from Gate 2020) (compulsory) 3. Fluid Mechanics - Fluid statics, properties, manometry, buoyancy, stability of floating bodies, forces on submerged bodies, control-volume analysis of mass, fluid acceleration, momentum and energy, differential equations of continuity and momentum, dimensional analysis, Bernoulli's equation, viscous flow of incompressible fluids, elementary turbulent flow, boundary layer, flow through pipes, bends and fittings and head losses in pipes 4. Thermodynamics (GATE 2020)- Properties of pure substances, thermodynamic systems and processes, the behaviour of ideal and real gases, calculation of work and heat in various processes, zeroth and first laws of thermodynamics, the second law of thermodynamics, thermodynamic relations and thermodynamic property charts and tables, availability and irreversibility. 5. Compressible Flows (GATE 2020): Basic concepts of compressibility, Conservation equations; One dimensional compressible flows, Fanno flow, Rayleigh flow; Isentropic flows, normal and oblique shocks, Prandtl-Meyer flow; Flow through nozzles and diffusers. <p>Candidates have to answer two sections – 1. Fluid Mechanics (compulsory) and 2. Either Thermodynamics or Compressible Flows</p>			
3	PAE03	Mechanics of Bio-inspired Composites	Master's Degree in Mechanical / Aerospace / Civil / Applied Mechanics or allied / equivalent areas with Solid Mechanics background.

Syllabus for screening test for PAE03

1. Basic Engineering Mathematics
2. Engineering Mechanics - Trusses and frames; Free body diagrams and equilibrium, virtual work; impulse and momentum (linear and angular), kinematics and dynamics of particles & of rigid bodies in plane motion and energy formulations, collisions.
3. Mechanics of Materials - Elastic constants, Stress and strain, Poisson's ratio, thin cylinders, Mohr's circle for plane stress and plane strain, shear force and bending moment diagrams, deflection of beams, bending and shear stresses, torsion of circular shafts, energy methods, Euler's theory of columns, thermal stresses, testing of materials with universal testing machine, strain gauges and rosettes, testing of hardness and impact strength.

4

PAE04

Machining and Precision Manufacturing

Masters (M.Tech/ME/MS) in Manufacturing Technology / Production Engineering/Mechanical Engineering / Applied Mechanics/Machine Design or Equivalent.

Syllabus for screening test for PAE04

1. Basic Engineering Mathematics
2. Engineering materials- Structure, phase diagrams and physical properties of engineering materials- Control of material properties -alloying- heat treatment- mechanical working and recrystallization.
3. Mechanics of Materials- Analysis of Stress, Strain and their relationships-Analysis of Bending, Shear, torsion and combined stresses - Mechanical behavior of materials -Testing methodologies- Residual Stress and effects.
4. Fundamentals of Plasticity-Plastic Deformation and Yield criteria-Mechanics of Metal Forming Processes- Principles, design and methods of bulk deformation processes - Solidification of pure metals and alloys- Principles, design and methods of Metal Casting- Fundamentals of Fusion Welding and solid state welding.
5. Mechanics of Metal Cutting- Single point and multi point cutting- Mechanism of Chip formation - Thermodynamics of chip formation- Types, Geometry and Materials of cutting tools- Tool Wear, Tool life and Machinability of materials- Multi axis CNC machining- Grinding and advanced finishing processes using abrasives- Tribology of machining- Non-traditional and Hybrid Manufacturing Techniques- Fundamentals of Additive Manufacturing.
6. Fundamentals of machine tool mechanisms- machine elements- Machine tool dynamics- Fundamentals of vibration-Theory of chatter in machining Processes.
7. Measurement of geometric features- Limits-Fits and tolerances- Gauge Design- Surface metrology- Non-destructive testing methodologies-Recent trends in metrology and precision manufacturing.

Department of Avionics			
1	PAV01	Wireless Communication and Signal Processing	B.Tech in ECE and M.Tech in Signal processing, Digital Signal Processing, Communication Systems and its equivalent.
2	PAV02	5G communication	
<p><u>Syllabus for screening test for PAV01 & PAV02</u></p> <ol style="list-style-type: none"> 1. Signals and Systems: - Continuous-time and discrete-time signals and systems - LTI systems, sampling and reconstruction - Transform domain analysis of LTI system- Fourier, Laplace, and Z-transforms - Discrete Fourier Transform (DFT)- Fast Fourier Transform algorithm -Design of FIR Digital filters, IIR Digital filters. Basics of Multirate processing - Decimation and Interpolation. 2. Probability and Random Processes: Probability axioms, conditional probability, discrete and continuous Rvs-CDF, PMF, PDF, conditional PMF/PDF, expected value, variance, functions of a RV, multiple random variables, joint CDF/PMF/PDF-independent/uncorrelated Rvs, sums of Rvs, moment generating function, random sums of Rvs- The sample mean, laws of large numbers, central limit theorem, convergence of sequence Rvs. Introduction to random processes(RP)- Mean and correlation of RP, stationary, wide sense stationary and ergodic processes. RP as inputs to linear time invariant systems: power spectral density, Gaussian processes as inputs to LTI systems, white Gaussian noise. 3. Linear Algebra :- Vector Spaces ,Properties of Vector Spaces, Subspaces, Span and Linear Independence, Bases, Dimension Inner-Product Spaces - Inner Products, Norms, Orthonormal Bases, Orthogonal Projections -Null Spaces and Ranges- Eigenvalues and Eigen vectors 4. Digital Communication:- Signal space concepts-Gram-Schmidt orthogonalization procedure. Matched filter receiver, ISI, Pulse Shaping, Nyquist criterion for zero ISI, Signaling with duobinary pulses, Eye diagram, Equalizer-Decision Procedure: Maximum a posteriori probability detector- Maximum likelihood detector, Error probability performance of binary signaling. Digital band pass modulation schemes: ASK, FSK, PSK, MSK – Digital M-ary modulation schemes – signal space representation Detection of signals in Gaussian noise 			
3	PAV03	Locomotion control of Humanoid Robots	M.E/M.Tech in Control Systems or Equivalent
<p><u>Syllabus for screening test for PAV03</u></p> <ol style="list-style-type: none"> 1. Linear Algebra: <ol style="list-style-type: none"> i) Solution of Linear Equations: Vectors and Linear Equations, The Idea of Elimination, Elimination Using Matrices, Rules for Matrix Operations, Inverse Matrices, Factorization, Transposes and Permutations. ii) Vector Spaces and Subspaces: Spaces of Vectors, The Null space of A: Solving $Ax = 0$, The Rank and the Row Reduced Form, The Complete Solution to $Ax = b$, Independence, Basis and Dimension, Dimensions of the Subspaces. iii) Orthogonality: Orthogonality of the Subspaces, Projections, Least Squares Approximations, Orthogonal Bases and Gram-Schmidt. Eigen values and Eigenvectors, Diagonalizing a Matrix, Applications to Differential Equations, Symmetric Matrices, Positive Definite Matrices, Similar Matrices, Singular Value Decomposition(SVD). 			

	<p>2. Linear Control System Theory:</p> <ul style="list-style-type: none"> i) Transfer function Approach: Open loop-and closed loop control systems- Transfer function - Control system components-Steady state error- static error coefficient- dynamic error coefficient-Stability Analysis- Root locus-Frequency domain analysis-Bode plot-polar plot-Nyquist stability criterion- Non-minimum phase system - transportation lag, Different types of compensators like PD, PI, PID, Lag, Lead etc. ii) State space Approach: State variable description of LTI systems, Continuous time systems and Discrete time systems, Different canonical forms, Similarity transformation, Solution of state equations, Controllability and Observability, Relation between state variable and input-output descriptions, Stability of State space models, Pole placement through full state feedback, Full order state observers <p>3. Kinematics, Dynamics and Control of robotic manipulators:</p> <ul style="list-style-type: none"> i) Representation of rigid body rotation: Rotation matrix, Composition of rotations, Similarity transformation, Parameterization of rotations, Euler Angle, Axis/Angle representation. iii) Representation of rigid body general motion: Homogeneous transformation matrix, Forward and Inverse kinematics, Velocity kinematics, Geometric and Analytic Jacobians, Manipulator redundancy, Singularity issues, Kineto-Static Duality, Closed loop inverse kinematics. iv) Dynamics and Control of serial chain manipulator: Euler-Lagrange formulation and Newton-Euler formulation for joint space dynamics, Task space dynamics based on task Jacobians, Inverse dynamics control for Joint space and task space. Task prioritization for redundant manipulators. 		
4	PAV04	EM Waves and Antenna Engineering	Masters in Engineering / Technology with Specialization in RF and Microwave Engineering or equivalent areas. The Candidate must have pursued the master's degree on the basis of qualified GATE score in Electronics and Communication
<p><u>Syllabus for screening test for PAV04</u></p> <ol style="list-style-type: none"> 1. Electromagnetic Waves: Wave equation & Uniform Plane waves – Plane waves in lossy and lossless mediums – Normal and oblique incidences of plane waves. 2. Transmission Line Theory: LCR model for transmission lines – Analogy with wave equations – characteristics of lossless lines – VSWR, Impedance matching – Smith chart – Case study. 3. Waveguides: TEM, TE, TM Waves – wave propagation in Rectangular, Circular & Planar wave guides. 4. Microwave Passive Components and Planar Transmission Lines, Scattering parameters, Microwave filter 5. Antennas: Basic Radiation Mechanism, Fundamental of Radiation, Antenna parameters, Equivalent Circuit of Antennas, Antenna in receiving mode. 6. Wire Antennas: Electrically Short or Small Dipoles, The Half-Wave Dipole, monopole antenna, Loop Antenna, Antenna Arrays – Fundamentals of Antenna Arrays , basic analysis and pattern of two element array, N-element linear array, broadside and end fire array, Pattern Multiplication Theorem, Yagi-Uda Antennas, Log Period Antenna, biconical antenna, Travelling wave antennas, Helical antenna, Folded dipole Antenna, fundamental concept of UWB Antennas, Microstrip Antennas, Fundamentals of Horn and Reflector Antenna Fundamentals of Antenna Measurements 			

5	PAV05	Development of Real Time Gas Sensor Array to Monitor Critical Gases in Crew Module for Human Space Program	ME/M.Tech in Electronics / VLSI /Instrumentation or equivalent areas. The Candidate must have pursued the master's degree on the basis of qualified GATE score in Electronics and Communication or Instrumentation engineering Desirable:- Candidates should have good knowledge in Semiconductor Devices or Material Synthesis or Electronics Circuit or Gas sensors
<p><u>Syllabus for screening test for PAV05</u></p> <ol style="list-style-type: none"> 1. Semiconductor Devices: Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Poisson and continuity equations; P-N junction, Zener diode, BJT, MOS capacitor, MOSFET. 2. Analog electronics: Characteristics and applications of the diode, Zener diode, BJT and MOSFET; small-signal analysis of transistor circuits, feedback amplifiers. Characteristics of operational amplifiers; applications of opamps: difference amplifier, adder, subtractor, integrator, differentiator, instrumentation amplifier, precision rectifier, active filters and other circuits. Oscillators, signal generators, voltage- controlled oscillators and phase-locked loop. 3. Digital Electronics: Combinational logic circuits, minimization of Boolean functions. IC families: TTL and CMOS. Arithmetic circuits, comparators, Schmitt trigger, multi-vibrators, sequential circuits, flip- flops, shift registers, timers and counters; sample-and-hold circuit, multiplexer, analog-to- digital (successive approximation, integrating, flash and sigma-delta) and digital-to- analog converters (weighted R, R-2R ladder and current steering logic). Characteristics of ADC and DAC (resolution, quantization, significant bits, conversion/settling time); basics of number systems, 8-bit microprocessor and microcontroller: applications, memory and input-output interfacing; basics of data acquisition systems. 			
Department of Earth and Space Sciences			
1	PES01	3D LiDAR Point Cloud Data Processing using Machine Learning Techniques	M.E/M.Tech/M.S. in Geoinformatics/Remote Sensing/GIS/Computer Science/Machine Learning/Information Technology or equivalent.
<p><u>Syllabus for screening test for PES01</u></p> <p>Section A: M.E/M.Tech/M. S. in Geoinformatics/Remote Sensing/GIS or equivalent</p> <ol style="list-style-type: none"> 1. Concepts of Remote Sensing: resolution, sensor, EM Spectra, spectral separability, spectral signatures, multispectral, hyperspectral, microwave, LiDAR remote sensing. 2. Concepts of Photogrammetry:parallax, stereo model, orientation, collinearity and coplanarity, aerotriangulation, orthophoto. 3. Digital Image Processing – Classification techniques, dimensionality reduction, spatial spectral filters, cross validation techniques, accuracy assessment. 4. GIS: Projection and coordinate system, vector/raster analysis, digital elevation model, 3D visualization, WebGIS. 			

	<p>5. Concepts of computer programming</p> <p>Section B: Students with M.E/M.Tech/M.S. in Computer Science/Machine Learning/Information Technology or equivalent</p> <ol style="list-style-type: none"> 1. Linear Algebra: matrix operations, eigen values and eigenvectors, solution space of system of equations 2. Probability: Fundamentals of probability, random variables, probability distributions 3. Image Processing: image sampling, quantization, color models, image enhancement techniques, image compression, segmentation 4. Machine Learning: Classification techniques, cross validation techniques, performance measures, dimensionality reduction methods, feature selection 5. Database and data structures: Basics of SQL, E-R models, SQL queries, data mining, data normalization, trees, hashing, kD tree, Quad Tree 6. Concepts of computer programming <p>Note: Candidates have to answer either Section A or B</p>		
2	PES02	Atmospheric Science (Aerosol-Cloud Interaction)	<p>*M.Sc / M.Tech (Atmospheric Science), M.Sc / M.Tech (Meteorology), M.Sc (Physics), M.Tech (Earth System Science) or any equivalent</p> <p>*Candidates with M.Sc. have to mandatorily clear a National Test indicated in SI No.2. Such candidates can be exempted from the screening test for PES02.</p>
<p><u>Syllabus for screening test for PES02</u></p> <ol style="list-style-type: none"> 1. Spectrum of electromagnetic radiation, Maxwell's equations in free space and linear isotropic media; boundary conditions on the fields at interfaces, radiance and irradiance, solid angle, concepts of scattering, absorption and polarization of radiation, blackbody radiation: the Plank function, Wien's displacement law, the Stefan Boltzmann law; Kirchoff's law, radiative equilibrium, physics of scattering and absorption by particles, Rayleigh scattering, Raman scattering, Lorentz-Mie theory of light scattering, geometric optics, atomic and molecular spectroscopy. 2. Composition of the atmosphere, equation of state, hydrostatic equilibrium, first law of thermodynamics, application of first law, entropy, second law, heat capacity, dry adiabatic processes, transfer processes, moist thermodynamic processes in atmosphere, static stability, global energy and entropy balances. 3. Atmospheric aerosols particle sources and strengths, particle size distribution and chemical compositions, transport, geographical distribution, residence time, cloud characteristics and processes, types of clouds, cloud microphysical processes, growth of cloud droplets, condensation, collision and coalescence, effects of aerosols on clouds: cloud condensation nuclei, cloud droplet spectra, and precipitation, cloud condensation nuclei, development of cloud droplet spectra, effect of aerosol on development of precipitation. 			
Department of Mathematics			
1	PMA01	Machine Learning	M.Tech / M.E. or related degree in Computer Science / Machine Learning & Computing or related areas
<p><u>Syllabus for screening test for PMA01</u></p> <ol style="list-style-type: none"> 1. Linear Algebra: Vector spaces, subspaces, linear independence, inner product spaces, orthogonal basis, conditional number, regularization techniques. 2. Matrices: Traces and determinants, eigenvalues and eigenvectors, matrix 			

	derivatives. 3. Probability: Fundamental axioms in probability, conditional probability, independence, random variables, expectation, probability distributions. 4. Machine Learning: Classification, regression, clustering, cross validation techniques, performance measures, dimensionality reduction methods, feature selection, association rules, neural networks, kernel methods, deep learning, graphical models, reinforcement learning
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Department of Physics

1	PPH01	Experimental Quantum Optics and Quantum Sensing	M.Sc. in Physics or BS-MS in Physics or equivalent.
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Table 2 : External Fellowship Holders

Candidates having a valid fellowship from Government agencies such as DST, CSIR, NBHM, UGC and State Government Science and Technology Scheme etc. may also apply for Ph.D. admission in various departments in IIST in the areas given below. Such candidates will be selected based on an Interview.

Sl. No.	Department	Department code	Research Area	Eligibility
1E	Chemistry	ECH01	Nanomaterials for EMI shielding and Energy Storage Applications	M.Sc or BS-MS in Chemistry or equivalent / M.Sc in Polymer Science or Biopolymers / M.Tech in Materials Science or allied branches
		ECH02	Toughened Ceramic Layered Composites	M.Sc or BS-MS in Chemistry or equivalent / M.Tech in Materials Science or allied branches
		ECH03	Energy Storage Materials	M.Sc or BS-MS in Chemistry or equivalent/ M.Sc in Polymer Science / M.Tech in Materials Science or allied branches.
		ECH04	Organic Functional Materials	
2E	Earth and Space Sciences	EES01	Mangroves Dynamics using Satellite Remote Sensing and GIS	Master degree in Remote Sensing/RS & Geographic Information System / Geoinformatics / Geography/ Applied Geography or equivalent field of study with master degree project carried out in remote sensing and GIS
		EES02	Atmospheric Science	M.Sc / M.Tech (Meteorology), M.Sc / M.Tech (Atmospheric Science), M.Sc / M.Tech (Oceanography), M.Sc (Physics) or M.Tech (Earth

				System Science) or any equivalent subject
3E	Humanities	EHS01	Operations and Supply Chain Management	M.E / M.Tech / M.S (By Research) in Industrial Engineering / Manufacturing Engineering / Industrial & Production Engineering / Technology Management/ Industrial Management / related Areas Or M.B.A. (Specialization in Operations Management with UGC-JRF)
4E	Mathematics	EMA01	Numerical Analysis	M.Sc Mathematics / BS-MS in Mathematics or Equivalent
		EMA02	Stochastic Processes; Queuing Theory	M.Sc / BS-MS in Mathematics
5E	Physics	EPH01	Quantum Information and Nonclassicality	MSc in Physics/Master of Science in Solid State Physics / BS-MS in Physics or Equivalent
		EPH02	Experimental Condensed Matter Physics, Strongly Correlated Electron System, High Tc Super Conductors, Magnetic Sensors, Transport Studies and Spectroscopic Imaging	M.Sc. in Physics, BS-MS in Physics / B.Tech in Engineering Physics with M.Sc./M.Tech in related areas of condensed matter physics
		EPH03	Applied/Adaptive Optics	M.Sc (Physics / Applied Physics) / M.Tech (Applied Optics / Optical Engineering / Optoelectronics / Photonics / Laser Technology) / BS-MS in Physics or Equivalent
		EPH04	Classical Optics, Quantum Optics, Quantum Information	MSc in Physics or Equivalent. MTech in Applied Optics / Optical Engineering or any Physics related areas. BS-MS in Physics or Equivalent.

RESEARCH FELLOWSHIP:

- 1) All scholars selected to the programme specializations listed in Table 1 shall receive a fellowship of Rs.31000/- per month. (Research Scholars selected with UGC/CSIR/NET-JRF/NBHM and State Government Science and Technology Scheme etc., shall draw fellowship from the concerned organizations). For all research scholars with external fellowship, the concerned rules and regulations apply.
- 2) The fellowship will be enhanced to Rs.35,000/- per month based on a performance review after two years of Research.
- 3) The scholars will be required to assist the Departments in tutorials, practical training in labs or similar academic activities normally limited to 6 hours per week.
- 4) The scholars will have to pay applicable fees as well as charges for the services provided by the Institute like boarding/lodging/medical facilities etc., as per IIST rules.
- 5) For those who receive fellowship from agencies such as DST, CSIR, NBHM, UGC and candidates who have been provided research fellowship by State Government Science and Technology Scheme through competitive written test etc., the Institute will not bear the fellowship of the student if the same is stopped due to any reasons by the concerned agency.
- 6) The Institute is completely residential and will provide accommodation to all the regular Ph.D students. However, in the event of shortage of rooms in the hostels, preference will be given for room allotment to candidates whose fellowships are borne by the Institute.

FEE STRUCTURE:

(To be paid at the beginning of every semester)

SI No	Description	Full Time
1	Tuition Fee/Statutory Semester Fee	1,500/-*
2	Student Amenities Fee	1,350/-
3	Hostel Charges	4,500/-**
4	Establishment Charges	4,000/-
5	Medical Charges	800/-
	Total	12,150/-
6	Registration Fee (One-Time)	1,000/-
7	Thesis Submission Fee (One-Time)	1,000/-
8	Re-Registration Fee (If any)	1,500/-

Note:

*For SC/ST/PD Tuition Fee/Statutory Semester Fee is exempted.

**Students of Ph.D programmes can purchase food coupons for Canteen Services separately.

*** Based on decisions of Board of Management, fees could be revised during the study period.

GENERAL SELECTION PROCEDURE:

- 1) **Applications will be received through on-line only.**
- 2) **Candidates having fellowship from funding agencies such as DST, CSIR, NBHM, UGC, State Government Science and Technology Scheme etc, applying to research areas in Table 2 may also apply for other research areas in Table 1, if eligible.**
- 3) Candidates are advised to visit the individual department profile for more details on the respective areas of research.
- 4) Candidates with valid fellowship from Government funding agencies shall upload a scanned copy of the fellowship award letter.
- 5) A short-list of applicants for Online screening test or interview will be displayed in IIST website by **24.06.2020**.
- 6) **Details of Online screening test will be announced later**
- 7) **Selection Criteria based on Online screening test & Interview:**
 - (i) The students who have participated in the Online screening test will be shortlisted if they secure a minimum of 30 % in each of Section A and Section B and a combined mark of 50 % and above for Section A and Section B together.
 - (ii) There will be a relaxation of 5 % for SC/ST/PD and OBC / EWS students, i.e., SC/ST/PD and OBC / EWS students require a combined mark of 45 % and above for Section A and Section B together, while the minimum is 30% in each of the Section A and B respectively.
 - (iii) There will be a 70 % weightage for the PhD Online screening test and 30 % weightage for the interview.
 - (iv) A student securing less than 10 marks out of 30 marks in the interview will not be selected irrespective of category and irrespective of the performance in the Online screening test.
 - (v) The combined mark for the PhD Online screening test and interview for a UR student should be 60 % and above to be selected
 - (vi) For the SC/ST/PD and OBC / EWS students, the combined mark for the PhD Online screening test and interview should be 55 % and above.

Candidates screened in through the online screening test will be called for an interview **through Video Conference mode (Skype/ Zoom)**

- 8) Provisionally selected candidates list, after the interview, will be displayed in the IIST website; the date **will be announced later.**
- 9) Admissions are governed by Ph.D Rules and Regulations of IIST. (<https://www.iist.ac.in/academics/rules-regulations>).
- 10) **The date of the Online screening test will not be changed under any circumstances. The date of interview span over a period of several days. In case the date and time of the interview clashes with the applicant's End semester examination in his/her qualifying examination, the Institute will consider shifting the date and time of interview within the overall window available.**
- 11) During interview, candidates will be tested in their main research area and not restricted to the syllabus of the Online screening test.

HOW TO APPLY:

- 1) Applications shall be submitted **online** at the IIST website: <http://admission.iist.ac.in>. Applications received online only will be considered.
- 2) The applicants will not be allowed to make any changes in their registration profile once submitted. Hence utmost care should be taken by the applicants while filling their profile
- 3) Application fee for General/EWS/OBC candidates who are male is Rs. 700/- per Department (for SC/ST/PD and Women applicants - Rs.350/- per Department). If the applicant is eligible and wishes to apply for more than one Research Area in the same Department, he/she need not pay any additional application fee. The application fee is non-refundable. Applicants, who wish to apply to multiple departments, will have to pay the appropriate application fee (sum of the application fee for each department).
- 4) The application fee shall be paid through online after the course registration only.
- 5) **Applicants who are employed in Government/Semi Government/PSUs/ Autonomous Bodies need to produce a "No Objection Certificate (NOC)" from the current employer at the time of Interview.**
- 6) SC/ST/OBC / EWS/Persons with Disabilities (PD) applicants shall upload the relevant certificate in the website before the prescribed date.

IMPORTANT DATES		
Sl. No.	Event	Date
1	Opening of IIST website for online submission of applications	May 15, 2020 - 1500 hrs (Friday)
2	Closing of IIST website for online submission of applications	June 15, 2020 – 2359 hrs (Monday)
3	Display of shortlisted candidates for Test	June 24, 2020 – 1700 hrs (Wednesday) (Tentative)*
4	Date of online screening test	Will be announced later
5	Publishing of screening test results	
6	Interview Dates	July 06 – 10, 2020 (Tentative)*
7	Display of Provisionally selected candidates	Will be announced later
8	Last Date of remittance of semester fee	
9	Reporting date at the Institution	
10	Classes begin for Ph.D Programme	
<p>* These dates are tentative and could change depending on the situation of the pandemic Covid-19 in the country.</p>		