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Indian Institute of Space Science and Technology

Thiruvananthapuram 695 547

Department of Mathematics

Academic Audit Report

2020-2021

Academic audit committee

Internal members

Sl.No.	Faculty Name	Role
1	**Dr. K. S. S. Moosath, Professor, Mathematics**	Chairman
2	**Dr. A. Salih, Professor, Aerospace Engineering**	Member
3	**Dr. Sarvesh Kumar, Professor, Mathematics**	Convenor

External members

Sl. No.	Name	Designation	Email	Mobile	Name of the Institute	Role
1	**Dr. K R Arun**	Associate Professor			IISER Thiruvananthapuram	Member
2	**Dr. Anilkumar V**	Professor(Rtd.) & Former Head			University of Calicut	Member

I Department profile

1	No. of Permanent Faculty Members	11
2	No. of Adjunct Faculty Members	0
3	No. of Contract Faculty Members	0
4	No. of Guest Faculty Members	0
5	No. of Emeritus Professors / Visiting Faculty Members	0
6	No. of Technical Staff / Tutors (Permanent)	0
7	No. of Technical Staff / Tutors (Contract)	3
8	No. of JRFs/ SRF/ JPF (excluding PhD students)	0
9	No. of Project Fellows	0
10	No. of Research Associates	0
11	No. of Post Doctoral Fellows	0

II Details of academic programmes and student strength in numbers

A .Undergraduate/ Dual Degree / Postgraduate programmes

Sl. No.	Programme	Year	Sanctioned strength in the academic year	Student strength in the academic year (At the start of even semester)	Female student strength in the academic year	No. of passed out Students	Pass Percentage
1	M.Tech.: Machine Learning and Computing (Standalone)	I Year	10	9	1	0	0.00
2	M.Tech.: Machine Learning and Computing (Standalone)	II Year	10	9	1	9	100.00
Total			20	18	2	9 .	

B. Details of Student Demand Ratio

Programme	No. of students applied	No. of students admitted	Comments	Suggestions
M.Tech.: Machine Learning and Computing (Standalone)	609	9		

C. Doctoral Degree

PhD	During the academic year			Degree awarded
	Sanctioned seats	No. of students admitted	Current student strength	
PART TIME	2	2	3	0
FULL TIME	3	3	18	1
Total	5	5	21	1

III Details of core courses and electives in each programme

Sl. No.	Programme Name	Course code	Course name	Core/ Elective	Credits assigned	As per curriculum revision/ newly added elective course/ syllabus revised
1	B.Tech.: Aerospace Engineering	MA835	Nonlinear Dynamics and Methods	Institute Elective	3	
2	B.Tech.: Aerospace Engineering	MA311	Probability, Statistics and Numerical Methods	Core	3	
3	B.Tech.: Aerospace Engineering	MA211	Linear Algebra, Fourier Series, Complex Analysis	Core	3	
4	B.Tech.: Aerospace Engineering	MA221	Integral Transforms, PDE and Calculus of Variations	Core	3	
5	B.Tech.: Aerospace Engineering	MA111	Calculus	Core	4	
6	B.Tech.: Aerospace Engineering	MA122	Computer Programming and Applications	Core	3	
7	B.Tech.: Aerospace Engineering	MA121	Vector Calculus and Ordinary Differential Equations	Core	3	
8	B.Tech.: Avionics	MA835	Nonlinear Dynamics & Methods	Institute Elective	3	

9	B.Tech.: Electronics and Communication Engineering(Avionics)	MA311	Probability, Statistics and Numerical Methods	Core	3	
10	B.Tech.: Electronics and Communication Engineering(Avionics)	MA211	Linear Algebra, Fourier Series, Complex Analysis	Core	3	
11	B.Tech.: Electronics and Communication Engineering(Avionics)	MA221	Integral Transforms, PDE and Calculus of Variations	Core	3	
12	B.Tech.: Electronics and Communication Engineering(Avionics)	MA111	Calculus	Core	4	
13	B.Tech.: Electronics and Communication Engineering(Avionics)	MA122	Computer Programming and Applications	Core	3	
14	B.Tech.: Electronics and Communication Engineering(Avionics)	MA121	Vector Calculus and Ordinary Differential Equations	Core	3	
15	Dual Degree: Astronomy & Astrophysics	MA835	Nonlinear Dynamics and Methods	Institute Elective	3	
16	Dual Degree: Solid State Physics	MA835	Nonlinear Dynamics and Methods	Institute Elective	3	
17	Dual Degree: Engineering Physics	MA311	Probability, Statistics and Numerical Methods	Core	3	
18	Dual Degree: Engineering Physics	MA211	Linear Algebra, Fourier Series, Complex Analysis	Core	3	
19	Dual Degree: Engineering Physics	MA221	Integral Transforms, PDE and Calculus of Variations	Core	3	
20	Dual Degree: Engineering Physics	MA111	Calculus	Core	4	
21	Dual Degree: Engineering Physics	MA122	Computer Programming and Applications	Core	3	
22	Dual Degree: Engineering Physics	MA121	Vector Calculus and Ordinary Differential Equations	Core	3	
23	M.Tech.: Structures and Design	MA625	Statistical Models and Analysis	Elective	3	
24	M.Tech.: RF and Microwave Engineering	MA615	Advanced Engineering Mathematics	Core	3	
25	M.Tech.: Digital Signal Processing	MA611	Optimization Techniques	Elective	3	
26	M.Tech.: Control Systems	MA611	Optimization Techniques	Elective	3	
27	M.Tech.: Power Electronics	MA619	Mathematics for Electrical Engineering	Core	3	
28	M.Tech.: Geoinformatics	MA812	Mathematical Methods	Elective	3	
29	M.Tech.: Geoinformatics	MA873	Graphical and Deep Learning Models	Elective	3	

30	M.Tech.: Machine Learning and Computing	MA851	Seminar	Core	1	
31	M.Tech.: Machine Learning and Computing	MA852	Project Work - Phase I	Core	14	
32	M.Tech.: Machine Learning and Computing	MA853	Project Work - Phase II	Core	17	
33	M.Tech.: Machine Learning and Computing	MA611	Optimization Techniques	Core	3	
34	M.Tech.: Machine Learning and Computing	MA613	Data Mining	Core	3	
35	M.Tech.: Machine Learning and Computing	MA617	Numerical Linear Algebra	Core	3	
36	M.Tech.: Machine Learning and Computing	MA618	Foundations of Machine Learning	Core	3	
37	M.Tech.: Machine Learning and Computing	MA869	Discrete Mathematics & Graph Theory	Elective	3	
38	M.Tech.: Machine Learning and Computing	MA632	Data Modeling Lab I	Core	2	
39	M.Tech.: Machine Learning and Computing	MA633	Data Mining Lab	Core	1	
40	M.Tech.: Machine Learning and Computing	MA634	Foundations of Machine Learning Lab	Core	1	
41	M.Tech.: Machine Learning and Computing	MA624	Advanced Machine Learning	Core	3	
42	M.Tech.: Machine Learning and Computing	MA625	Statistical Models and Analysis	Core	3	
43	M.Tech.: Machine Learning and Computing	MA872	Advanced Optimization	Core	3	
44	M.Tech.: Machine Learning and Computing	MA873	Graphical and Deep Learning Models	Core	3	
45	M.Tech.: Machine Learning and Computing	MA642	Data Modeling Lab	Core	2	
46	M.Tech.: Machine Learning and Computing	MA643	Statistical Modeling Lab	Core	1	
47	M.Tech.: Machine Learning and Computing	MA644	Advanced Machine Learning Lab	Core	1	
48	Ph.D.: Course Work - January	MA812	Mathematical Methods	Credited	3	
49	Ph.D.: Course Work - January	MA869	Discrete Mathematics and Graph Theory	Credited	3	
50	Ph.D.: Course Work - January	MA872	Advanced Optimization	Credited	3	
51	Ph.D.: Course Work - January	MA625	Statistical Models and Analysis	Credited	3	
52	Ph.D.: Course Work - July	MA834	Advanced Ananlysis	Credited	3	
53	Ph.D.: Course Work - July	MA843	Numerical Solutions to PDE using Octave	Credited	3	
54	Ph.D.: Course Work - July	MA831	Probability Theory	Credited	3	
55	Ph.D.: Course Work - July	MA618	Foundations of Machine Learning	Credited	4	
56	Ph.D.: Course Work - July	MA611	Optimization Techniques	Core	3	
57	Ph.D.: Course Work - July	MA835	Nonlinear Dynamics and Methods	Audited	3	
58	Ph.D.: Course Work - July	MA613	Data Mining	Credited	3	
59	Ph.D.: Course Work - July	MA812	Mathematical Methods	Credited	3	

60	Ph.D.: Course Work - July	MA617	Numerical Linear Algebra	Credited	3	

IV Review on Curriculum

Criteria	Reponse	Revision made during this academic year	Comments on curriculum, if any	Suggestions for Improvement
Qualitative comment on the content of the curriculum	EXCELLENT	no	Revision is done in 2018	

V Review on Teaching, Learning and Evaluation

Sl. No.	Criteria	Response based on criteria	Comments	Suggestions
1	Any innovative teaching methods/aids adopted?	No		
2	Is any e-learning modules developed?	Yes Zoom Platform was used for Teaching during 2020-2021. Moodle was used for uploading Teaching Materials and for references. Students were allowed to the video lectures through Moodle platform. Assignments and Examinations were conducted using Mood		
3	**Student evaluation procedure**			
Criteria		**Response**	**Comments**	**Suggestions**
Course evaluation		Internal		
Project evaluation		Internal External		
4	**Evaluation components**			
Criteria		**Response**	**Comments**	**Suggestions**
Theory		Continuous assesment and end semester exam Continuous assesment and course project Continuous assesment and end semester exam, Continuous assesment and course project	60% weightage for Quizes, Assignment, etc and 40% weightage for End Semester Examination.	
Lab		Continuous assesment and end semester exam		
Project/ Internship/ Seminar		Mid term evaluaion and final evaluation Final evaluation	30% Supervisor Evaluation, 20% Mid-Semester Evaluation and 50% End Semester Examination.	
5	**Continuous Assessment Components**			
Theory		Quiz I Quiz II Others - Assignment Surprise Test Mini Project		
Lab		Class exercise evaluation End Semester Examination Class exercise evaluation & End Semester Examination		
6	Is there any remedial coaching to support weak performers?	Yes	In the summer three weeks remedial coaching for Backlog Students were conducted online.	
7	Is academic feedback from students taken regularly?	Yes	Feedback for each course has been taken.	
8	What are the steps taken based on student's feedback?	Proper actions were taken by individual faculty members against critical comments.		
9	Is Class committee meetings conducted?	Yes Departments which are offering the programmes and the faculty who handle the courses were attended.		

VI Department faculty credentials

Sl. No.	Criteria	Response	Comments	Suggestions
1	Percentage of faculty with PhD	100		
2	No. of journal articles published	16		
3	No. of books published	0		
4	No. of book chapters published	0		
5	No. of invited talks/ conferences/ workshops attended	10		
6	No. of research projects funded by IIST	0		
7	No. of research projects funded through ASRG/IIST-ISRO/DoS	0		
8	No. of externally funded research projects like CSIR, DST, DRDO etc.	0		
9	No. of patents published/awarded	0		
10	No. of patents filed	0		
11	No. of faculty/student awards received	1		
12	No. of conferences/Workshops/seminars/ Colloquium Organized	1		
13	No. of conference paper published	2		
14	No. of visits made by the faculty/student for research collaborations/invited talks/ conferences abroad	0		
15	No. of Industry collaborative projects	0		
16	No. of ISRO mission related projects/ activities	0		
17	No. of consultancy services entertained	0		

VIII Details of student co-curricular activities

Criteria	Response	Comments	Suggestions
Whether students are involved in extra curricular & co- curricular activities?	Yes NIL		
Whether students are doing internship abroad?	No		
Whether students are doing internship at national academic institutes / universities?	Yes IIST funded Externally sponsored Self sponsored		
Whether students are doing internship at ISRO/ industries/ R&D institutes?	Yes IIST funded Externally sponsored Self sponsored		
Whether the department conducts outreach programs?	No		
Whether department has alumni activities?	Yes Mentoring and helping in placement.		

IX Details of placement/ higher studies of students

Criteria	UG	PG	PhD	Comments	Suggestions

No. of students placed	0	5	1	No UG Programme under Mathematics Department 1. Darshanam Srujan Kumar - Data Scientist in Keydabra Informaion Technology and services 2. Durgesh Kumar Singh - University of ARTEC, Norway (Doing Ph.D) 3. Ragja Palakkadavath - Researcher at TCS Research, Pune 4. Sharma Amitesh Jayshankar - Data Scienctist at Fidelity Investements, Bangalore 5. Srikanth Nayak - Legato Health Technologies, Hyderabad	
No. of students opted for higher studies	0	0	0		
No. of students cleared GATE/ SLET/ NET/ CSIR/ UGC/ Others etc.	0	0	0	Not Applicable	

X Infrastructure in the Department

Sl. No.	Criteria	Response	Comments	Suggestions
1	No. of classrooms	1		
2	No. of seminar/ conference rooms	1		
3	No. of instruction labs	2		
4	No. of research labs	1		
5	No. of full-fledged e-learning classrooms	1		
6	No. of computing labs	1		
7	Is there any lab with potential for centre of excellence?	No		
8	Is there any labs sponsored by external agency?	No		
9	Inter-disciplinary research facility	No		
10	Is there any common amenities like restroom, recreation club, etc.?	Department is having a room for conducting Mathematics Club activities.		
11	Is there any facilities for differently abled?	Yes. Lift, Ramp and Toilet.		
12	Is there any Department library?	No		

XII Additional Information

1.	Does the curriculum of each programme offered by the department provide the Programme Educational Objectives (PEOs)/Programme Specific Outcomes (PSOs) and Programme Outcomes (POs)?	Yes
2.	Do the courses offered in each programme by the department provide the Course Objectives and Course Outcomes (COs) written in clear terms?	Yes
3.	Give the status of adopting Choice Based Credit System (CBCS) in the programmes offered by the department	Implemented
4.	Give the status of adopting Objective Based Education (OBE) in the programmes offered by the department.	Implemented
5.	Satisfaction level of support of academic, administrative, and other support units of the institution	Very good

6.	The status of taking feedback from stakeholders and expert groups for revision and design of curriculum of a programme.	Student Alumni Academic Peers
7.	The list of extension programmes conducted by the department	NIL
8.	List Faculty Development Programme conducted (any programme aiming at updating the knowledge of faculty of the department).	NIL
9.	Does students take projects involving Field work/Survey. If yes, give the list.	No
10.	The List of MoU and MoAs, that are currently operational during the year.	NIL
11.	Detail the mechanism adopted to help academically disadvantaged students to cope with academic requirements	Academically disadvantaged students are identified by the concerned faculty members and they extended supported by supplying the extra study materials online for improving their learning.
12.	Detail the mechanism adopted to help students who perform very much below the class averages	We advice such students to have online personal interaction with the faculty members and encourage them to solve more problems.
13.	The total grant/revenue generated/received from different agencies by the department conducting research projects/consultancy services during the year.	NIL
14.	The suggestions to improve the efficiency and effectiveness of the IIST system.	To plan the Academic activities in the beginning of the Academic Session and monitor it throughout the year.

XIII Strength of the Department (maximum 150 words)

Faculty members are having expertise in diverse fields like PDE, Geometry, Machine learning, Algebra, Non-linear Dynamics and Stochastic Processes and all are active in Research in the upcoming areas. The Maths core papers offered for B.Tech and M.Tech is adequate in equipping the students with the skills which is required in the Space Science and Technology areas . The papers offered to Research students are also for advanced level. M.Tech course in Machine Learning and Computing and all the students in that programme are getting placed.

XIV Weakness of the Department (maximum 150 words)

Faculty are lacking in having collaborative research works with other Departments of IIST. Limited Computational Facility. Number of space related projects were not adequate. Number of faculty is not adequate.

XV Challenges (maximum 150 words)

Online classes for B.Tech and M.Tech students were conducted with limited resources. Generating academic related avenues for getting jobs in the new areas like Data Analysis, Machine Learning, etc.

XVI Opportunities (maximum 150 words)

Efficient faculty members are available in the Department to improve the research consultancy. Jointly organize International Workshops/ Conferences with National Institutes.

XVII Any other details relevant to the department

Department invites External Expert for delivering lectures. Faculty Members used to give lectures in FDP, Workshops and Conferences. Department is having a Mathematics Club with Students and faculties, and this club organize monthly talks.

Final Recommendations

Teaching and research activities of the Department during this period is good. The facilities and opportunities available are adequate. However there are scope for improvement. * Department should be strengthened with addition of faculties and programs. * Computational facility need to be improved. * Institutional support for conducting Workshops and training programs in Department. * Integrated BS-MS program in Mathematics and Computing may be started. * Number of seats in the M.Tech program may be increased. * Unfilled seats under the ISRO quota can be converted to open category.

On the day of visit, the team verified all the documents and records available in the department and evaluated the academic process. A detailed report of the audit is given above. The report is signed by the following:

Signature of Committee Members

1 **Dr. K. S. S. Moosath**, Professor, Mathematics: .....

2 **Dr. A. Salih**, Professor, Aerospace Engineering: .....

3 **Dr. Sarvesh Kumar**, Professor, Mathematics: .....

4 **Dr. K R Arun**, Associate Professor, IISER Thiruvananthapuram: .....

5 **Dr. Anilkumar V**, Professor(Rtd.) & Former Head, University of Calicut: .....

Approved by,

Dean Academics,
IIST

प्रोफ. कुरुविळा जोसफ़/Prof. Kuruvilla Joseph
डीन (शैक्षिणी), आईआईएसटी
Dean (Academics), IIST