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Indian Institute of Space Science and Technology

Thiruvananthapuram 695 547

Department of Mathematics

Academic Audit Report

2018-2019

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. Anilkumar V	Professor(Rtd.) & Former Head			University of Calicut	Member
2	Dr. K R Arun	Associate Professor			IISER TVM	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	1

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	5	1	0	0.00
2	M.Tech.: Machine Learning and Computing (Standalone)	II Year	10	5	1	5	100.00
Total			20	10	2	5 .	

B. Details of Student Demand Ratio

Programme	No. of students applied	No. of students admitted	Comments	Suggestions
M.Tech.: Machine Learning and Computing (Standalone)	278	5		

C. Doctoral Degree

PhD	During the academic year			Degree awarded
	Sanctioned seats	No. of students admitted	Current student strength	
PART TIME	0	0	1	1
FULL TIME	2	2	13	1
Total	2	2	14	2

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	Revised
2	B.Tech.: Aerospace Engineering	MA311	Probability, Statistics and Numerical Methods	Core	3	Revised
3	B.Tech.: Aerospace Engineering	MA211	Linear Algebra, Complex Analysis and Fourier Series	Core	3	Revised
4	B.Tech.: Aerospace Engineering	MA221	Integral Transforms, PDE and Calculus of Variations	Core	3	Revised
5	B.Tech.: Aerospace Engineering	MA111	Calculus	Core	4	Revised
6	B.Tech.: Aerospace Engineering	MA121	Vector Calculus and Ordinary Differential Equations	Core	3	Revised
7	B.Tech.: Aerospace Engineering	MA122	Computer Programming and Applications	Core	3	Revised
8	B.Tech.: Avionics	MA835	Nonlinear Dynamics and Methods	Institute Elective	3	Revised
9	B.Tech.: Avionics	MA311	Probability, Statistics and Numerical Methods	Core	3	Revised

10	B.Tech.: Avionics	MA211	Linear Algebra, Complex Analysis and Fourier Series	Core	3	Revised
11	B.Tech.: Avionics	MA221	Integral Transforms, PDE and Calculus of Variations	Core	3	Revised
12	B.Tech.: Electronics and Communication Engineering(Avionics)	MA111	Calculus	Core	4	Revised
13	B.Tech.: Electronics and Communication Engineering(Avionics)	MA121	Vector Calculus and Ordinary Differential Equations	Core	3	Revised
14	B.Tech.: Electronics and Communication Engineering(Avionics)	MA122	Computer Programming and Applications	Core	3	Revised
15	Dual Degree: Solid State Physics	MA835	Nonlinear Dynamics and Methods	Institute Elective	3	Revised
16	Dual Degree: Engineering Physics	MA311	Probability, Statistics and Numerical Methods	Core	3	Revised
17	Dual Degree: Engineering Physics	MA211	Linear Algebra, Complex Analysis and Fourier Series	Core	3	Revised
18	Dual Degree: Engineering Physics	MA221	Integral Transforms, PDE and Calculus of Variations	Core	3	Revised
19	Dual Degree: Engineering Physics	MA111	Calculus	Core	4	Revised
20	Dual Degree: Engineering Physics	MA121	Vector Calculus and Differential Equations	Core	3	Revised
21	Dual Degree: Engineering Physics	MA122	Computer Programming and Applications	Core	3	Revised
22	M.Tech.: RF and Microwave Engineering	MA615	Advanced Engineering Mathematics	Core	4	Revised
23	M.Tech.: Geoinformatics	MA812	Mathematical Methods	Core	3	Revised
24	M.Tech.: Machine Learning and Computing	MA711	Self Study Course	Core	3	Revised
25	M.Tech.: Machine Learning and Computing	MA712	Comprehensive Viva	Core	2	Revised
26	M.Tech.: Machine Learning and Computing	MA851	Seminar	Core	2	Revised
27	M.Tech.: Machine Learning and Computing	MA852	Project Phase I	Core	7	Revised
28	M.Tech.: Machine Learning and Computing	MA853	Project Phase II	Core	18	Revised
29	M.Tech.: Machine Learning and Computing	MA611	Optimization Techniques	Core	3	Revised
30	M.Tech.: Machine Learning and Computing	MA613	Data Mining	Core	4	Revised
31	M.Tech.: Machine Learning and Computing	MA617	Numerical Linear Algebra	Core	3	Revised
32	M.Tech.: Machine Learning and Computing	MA618	Foundations of Machine Learning	Core	4	Revised
33	M.Tech.: Machine Learning and Computing	MA632	Data Modeling Lab	Core	2	Revised
34	M.Tech.: Machine Learning and Computing	MA624	Advanced Machine Learning	Core	4	Revised
35	M.Tech.: Machine Learning and Computing	MA625	Statistical Models and Analysis	Core	4	Revised
36	M.Tech.: Machine Learning and Computing	MA871	Advanced Kernel Methods	Elective	3	Revised

37	M.Tech.: Machine Learning and Computing	MA876	Introduction to Internet of Things	Elective	3	Revised
38	M.Tech.: Machine Learning and Computing	MA642	Data Modeling Lab II	Core	2	Revised
39	Ph.D.: Course Work - January	MA835	Nonlinearr Dynamics and methods	Credited	3	Revised
40	Ph.D.: Course Work - January	MA8	Research Methodology - II	Core	1	Revised
41	Ph.D.: Course Work - January	MA827	Advance & Functional Analysis	Credited	3	Revised
42	Ph.D.: Course Work - January	MA830	Distribution Theory and Sobolev Spaces	Credited	3	Revised
43	Ph.D.: Course Work - January	MA834	Advanced Analysis	Credited	3	Revised
44	Ph.D.: Course Work - January	MA81	Research Methodology - II	Core	1	Revised
45	Ph.D.: Course Work - January	MA617	Numerical Linear Algebra	Credited	3	Revised
46	Ph.D.: Course Work - January	MA811	Research Methodology	Core	3	Revised
47	Ph.D.: Course Work - January	MA812	Mathematical Methods	Credited	3	Revised
48	Ph.D.: Course Work - July	MA81	Research Methodology - II	Credited	1	Revised
49	Ph.D.: Course Work - July	MA845	Partial Differential Equations	Credited	3	Revised
50	Ph.D.: Course Work - July	MA827	Advanced Functional Analysis	Credited	3	Revised
51	Ph.D.: Course Work - July	MA830	Distribution Theory and Sobolev Spaces	Credited	3	Revised
52	Ph.D.: Course Work - July	MA8	Research Methodology - II	Core	1	Revised
53	Ph.D.: Course Work - July	MA812	Mathematical Methods	Credited	3	Revised
54	Ph.D.: Course Work - July	MA811	Research Methodology	Credited	3	Revised
55	Ph.D.: Course Work - July	MA617	Numerical Linear Algebra	Credited	3	Revised
56	Ph.D.: Course Work - July	MA615	Advanced Engineering Mathematics	Credited	4	Revised
57	Ph.D.: Course Work - July	MA834	Advanced Analysis	Credited	3	Revised
58	Ph.D.: Course Work - July	MA835	Nonlinear Dynamics and Methods	Credited	3	Revised

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	yes	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 NPTEL lecture series developed for Ordinary Differential Equations		
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	50% weightage for Quizes, Assignment, etc and 50% 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 summer three weeks remedial coaching for Backlog Students was conducted.	
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 Class committee meetings were conducted by 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	26		
3	No. of books published	0		
4	No. of book chapters published	0		
5	No. of invited talks/ conferences/ workshops attended	26		
6	No. of research projects funded by IIST	0		
7	No. of research projects funded through ASRG/IIST-ISRO/DoS	1		
8	No. of externally funded research projects like CSIR, DST, DRDO etc.	1		
9	No. of patents published/awarded	0		
10	No. of patents filed	0		
11	No. of faculty/student awards received	3		
12	No. of conferences/Workshops/seminars/ Colloquium Organized	2		
13	No. of conference paper published	5		
14	No. of visits made by the faculty/student for research collaborations/invited talks/ conferences abroad	2		

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?	Yes 1. Young Talent Nurture Program 2. Instructional School for Teachers on "Differential Equations"	1. Young Talent Nurture is a Training Programme in Mathematics for BSc Students, where 40 participants were selected from all over India. 2. Instructional School for Teachers on "Differential Equations" was sponsored by National Programme on Differential Equations, IIT Bombay. 40 participants were selected from all over India.	
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	4	1	No UG programme under Mathematics Department Bhartendu Thakur - Mercedes Benz Sumit Kumar Singh - TCS, Hyderabad H. Viji - VSSC Nasibullah - Flytxt, Trivandrum	
No. of students opted for higher studies	0	1	0	Rahul Vashisht - IIT Madras	
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.	Action Initiated
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	1. Young Talent Nurture is a Training Programme in Mathematics for BSc Students, where 40 participants were selected from all over India. 2. Instructional School for Teachers on "Differential Equations" was sponsored by National Programme on Differe
8.	List Faculty Development Programme conducted (any programme aiming at updating the knowledge of faculty of the department).	Instructional School for Teachers on "Differential Equations" was sponsored by National Programme on Differential Equations, IIT Bombay. 40 participants were selected from all over India.
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 support by supplying the extra study materials for improving their learning.
12.	Detail the mechanism adopted to help students who perform very much below the class averages	We advise such students to have 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.	5 lakhs from VSSC

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)

Well qualified and experienced faculty members having specializations in PDE, Machine Learning, Differential Geometry, Algebra, Stochastic Processes, Control Theory and Non-linear Dynamics are actively engaged in Research work and contributing to certain ISRO related projects. A wide range of courses are offered to equip the students to work in Space Science and Technology areas also. All the M.Tech in Soft Computing students were getting placed through campus placement.

XIV Weakness of the Department (maximum 150 words)

Department lacks faculty in other areas like Topology, Cryptography, etc. to diversify the Research and Teaching. Limited Computational Facility. Number of external projects were not adequate. No Master Program in Mathematics. Not sufficient number of faculty in the area of Machine Learning.

XV Challenges (maximum 150 words)

Taking up more projects related to ongoing programmes of ISRO. Research Collaboration with industry.

XVI Opportunities (maximum 150 words)

Faculty members encouraged to submit Research proposal to ISRO. Institute provides financial support to attend National and International Conferences.

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.

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

5 **Dr. K R Arun**, Associate Professor, IISER TVM: .....

Approved by,

Dean Academics,
IIST

प्रोफ. कुरुविला जोसफ/Prof. Kuruvilla Jose
डीन (शैक्षिकी), आईआईएसटी
Dean (Academics), IIST