Indian Institute of Space Science and Technology

Thiruvananthapuram 695 547

Department of Physics

Academic Audit Report

2019-2020

Academic audit committee

Internal members

Sl.No.	Faculty Name	Role
1	**Dr. Sudheesh Chethil, Associate Professor, Physics**	Chairman
2	**Dr. Sooraj Ravindran, Associate Professor, Avionics**	Member
3	**Dr. Apoorva Nagar, Associate Professor, Physics**	Convenor

External members

Sl. No.	Name	Designation	Email	Mobile	Name of the Institute	Role
1	**Dr. Rajeev N Kini**	Associate Professor			IISER Thiruvananthapuram	Member

I Department profile

1	No. of Permanent Faculty Members	13
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	3

6	No. of Technical Staff / Tutors (Permanent)	1
7	No. of Technical Staff / Tutors (Contract)	8
8	No. of JRFs/ SRF/ JPF (excluding PhD students)	13
9	No. of Project Fellows	35
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	Dual Degree: Engineering Physics (B.Tech.)+ M.Tech./ Master of Science	I Year	22	22	1	0	0.00
2	Dual Degree: Engineering Physics (B.Tech.)+ M.Tech./ Master of Science	II Year	20	20	0	0	0.00
3	Dual Degree: Engineering Physics (B.Tech.)+ M.Tech./ Master of Science	III Year	20	20	2	0	0.00
4	Dual Degree: Eng. Physics (B.Tech.)+ Optical Engineering(M.Tech.)	IV Year	20	4	0	0	0.00
5	Dual Degree: Eng. Physics (B.Tech.)+ Optical Engineering(M.Tech.)	V Year	20	4	1	4	100.00
6	Dual Degree: Eng. Physics (B.Tech.)+ Solid State Physics(Master of Science)	IV Year	20	4	1	0	0.00
7	Dual Degree: Eng. Physics (B.Tech.)+ Solid State Physics(Master of Science)	V Year	20	6	1	6	100.00
8	M.Tech.: Optical Engineering (Standalone)	I Year	10	5	3	0	0.00
9	M.Tech.: Optical Engineering (Standalone)	II Year	10	3	0	2	66.67

10	M.Tech.: Solid State Technology (Standalone)	I Year	10	5	1	0	0.00
11	M.Tech.: Solid State Technology (Standalone)	II Year	10	0	0	0	0.00
Total			182	93	10	12 .	

B. Details of Student Demand Ratio

Programme	No. of students applied	No. of students admitted	Comments	Suggestions
Dual Degree: Engineering Physics (B.Tech.)+ M.Tech./ Master of Science	0	0		
Dual Degree: Eng. Physics (B.Tech.)+ Optical Engineering (M.Tech.)	3155	4		
Dual Degree: Eng. Physics (B.Tech.)+ Solid State Physics (M.Tech.)	3155	5		
M.Tech.: Optical Engineering (Standalone)	141	5		
M.Tech.: Solid State Technology (Standalone)	101	5		

C. Doctoral Degree

PhD	During the academic year			Degree awarded
	Sanctioned seats	No. of students admitted	Current student strength	
PART TIME	0	0	0	0
FULL TIME	6	6	0	5
Total	6	6	0	5

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	PH111	Physics I	Core	4	
2	B.Tech.: Aerospace Engineering	PH131	Physics Lab	Core	1	
3	B.Tech.: Aerospace Engineering	PH121	Physics II	Core	4	

4	B.Tech.: Electronics and Communication Engineering(Avionics)	PH111	Physics I	Core	4	
5	B.Tech.: Electronics and Communication Engineering(Avionics)	PH131	Physics Lab	Core	1	
6	B.Tech.: Electronics and Communication Engineering(Avionics)	PH121	Physics II	Core	4	
7	Dual Degree: Earth System Science	PH452	Summer Internship and Training	Core	3	
8	Dual Degree: Astronomy & Astrophysics	PH452	Summer Internship and Training	Core	3	
9	Dual Degree: Optical Engineering	PH554	Project Phase II	Core	20	
10	Dual Degree: Optical Engineering	PH551	Project Phase I	Core	13	
11	Dual Degree: Optical Engineering	PH552	Comprehensive Viva-Voce II	Core	2	
12	Dual Degree: Optical Engineering	PH411	Optical Engineering Fundamentals	Core	3	
13	Dual Degree: Optical Engineering	PH412	Opto Mechanical Design Analysis	Core	3	
14	Dual Degree: Optical Engineering	PH413	Optical Fabrication and Testing	Core	3	
15	Dual Degree: Optical Engineering	PH414	Lasers and Optoelectronics	Core	3	
16	Dual Degree: Optical Engineering	PH419	Fourier Optics	Elective	3	
17	Dual Degree: Optical Engineering	PH431	Optics and Optoelectronics Lab	Core	1	
18	Dual Degree: Optical Engineering	PH432	Design and Analysis Lab	Core	1	
19	Dual Degree: Optical Engineering	PH452	Summer Internship and Training	Core	3	
20	Dual Degree: Optical Engineering	PH421	Guided Wave Optics	Core	3	
21	Dual Degree: Optical Engineering	PH422	Adaptive Optics	Core	3	
22	Dual Degree: Optical Engineering	PH423	Optical System Analysis and design	Core	3	

23	Dual Degree: Optical Engineering	PH464	Optical Communication	Elective	3	
24	Dual Degree: Optical Engineering	PH468	MEMS and MOEMS	Elective	3	
25	Dual Degree: Optical Engineering	PH470	Quantum Optical Communication	Elective	3	
26	Dual Degree: Optical Engineering	PH441	Guided Wave Optics Lab	Core	1	
27	Dual Degree: Optical Engineering	PH442	Adaptive Optics Lab	Core	1	
28	Dual Degree: Optical Engineering	PH451	Seminar	Core	1	
29	Dual Degree: Solid State Physics	PH555	Project Phase II	Core	18	
30	Dual Degree: Solid State Physics	PH553	Project Phase I	Core	16	
31	Dual Degree: Solid State Physics	PH415	Advanced Solid State Physics	Core	4	
32	Dual Degree: Solid State Physics	PH416	Quantum Mechanics II	Core	4	
33	Dual Degree: Solid State Physics	PH417	Semiconductor Physics	Core	4	
34	Dual Degree: Solid State Physics	PH418	Experimental Physics	Core	3	
35	Dual Degree: Solid State Physics	PH433	Solid State Physics Lab II	Core	1	
36	Dual Degree: Solid State Physics	PH452	Summer Internship and Training	Core	3	
37	Dual Degree: Solid State Physics	PH424	Advanced Statistical Mechanics	Core	4	
38	Dual Degree: Solid State Physics	PH425	Computational Physics	Core	3	
39	Dual Degree: Solid State Physics	PH470	Quantum Optical Communication	Elective	3	
40	Dual Degree: Solid State Physics	PH475	Cold Atoms and Einstein Condensates	Elective	3	
41	Dual Degree: Solid State Physics	PH443	Solid State Physics Lab III	Core	1	
42	Dual Degree: Solid State Physics	PH453	Mini Project	Core	2	
43	Dual Degree: Solid State Physics	PH454	Comprehensive Viva Voce II	Core	2	
44	Dual Degree: Engineering Physics	PH311	Quantum Mechanics	Core	4	

45	Dual Degree: Engineering Physics	PH312	Statistical Mechanics	Core	3	
46	Dual Degree: Engineering Physics	PH331	Modern Physics Lab	Core	1	
47	Dual Degree: Engineering Physics	PH321	Introduction to Solid State Physics	Core	3	
48	Dual Degree: Engineering Physics	PH361	Quantum Information Theory	Elective	3	
49	Dual Degree: Engineering Physics	PH470	Quantum Optical Communication	Elective	3	
50	Dual Degree: Engineering Physics	PH475	Cold Atoms and Bose-Einstein Condensates	Elective	3	
51	Dual Degree: Engineering Physics	PH341	Solid State Physics Lab	Core	1	
52	Dual Degree: Engineering Physics	PH351	Comprehensive Viva-Voce I	Core	3	
53	Dual Degree: Engineering Physics	PH211	Electrodynamics and Special Relativity	Core	3	
54	Dual Degree: Engineering Physics	PH212	Mathematical Physics	Core	4	
55	Dual Degree: Engineering Physics	PH231	Optics Lab I	Core	1	
56	Dual Degree: Engineering Physics	PH221	Modern Optics	Core	3	
57	Dual Degree: Engineering Physics	PH222	Classical Mechanics	Core	4	
58	Dual Degree: Engineering Physics	PH241	Optics Lab II	Core	1	
59	Dual Degree: Engineering Physics	PH111	Physics I	Core	4	
60	Dual Degree: Engineering Physics	PH131	Physics Lab	Core	1	
61	Dual Degree: Engineering Physics	PH121	Physics II	Core	4	
62	M.Tech.: Optical Engineering	PH751	Project Phase I	Core	13	
63	M.Tech.: Optical Engineering	PH752	Comprehensive Viva	Core	2	
64	M.Tech.: Optical Engineering	PH754	Project Phase II	Core	20	
65	M.Tech.: Optical Engineering	PH611	Optical Engineering Fundamentals	Core	3	

66	M.Tech.: Optical Engineering	PH612	Opto Mechanical Design Analysis	Core	3	
67	M.Tech.: Optical Engineering	PH613	Optical Fabrication and Testing	Core	3	
68	M.Tech.: Optical Engineering	PH614	Lasers and Optoelectronics	Core	3	
69	M.Tech.: Optical Engineering	PH619	Fourier Optics	Elective	3	
70	M.Tech.: Optical Engineering	PH631	Optics and Optoelectronics Lab	Core	1	
71	M.Tech.: Optical Engineering	PH632	Design and Analysis Lab	Core	1	
72	M.Tech.: Optical Engineering	PH621	Guided Wave Optics	Core	3	
73	M.Tech.: Optical Engineering	PH622	Adaptive Optics	Core	3	
74	M.Tech.: Optical Engineering	PH623	Optical System Analysis and Design	Core	3	
75	M.Tech.: Optical Engineering	PH664	Optical Communication	Elective	3	
76	M.Tech.: Optical Engineering	PH668	MEMS and MOEMS	Elective	3	
77	M.Tech.: Optical Engineering	PH670	Quantum Optical Communication	Elective	3	
78	M.Tech.: Optical Engineering	PH641	Guided Wave Optics Lab	Core	1	
79	M.Tech.: Optical Engineering	PH642	Adaptive Optics Lab	Core	1	
80	M.Tech.: Optical Engineering	PH651	Seminar	Core	1	
81	M.Tech.: Solid State Technology	PH615	Advanced Electromagnetics	Core	3	
82	M.Tech.: Solid State Technology	PH616	Statistical and Semiconductor Physics	Core	4	
83	M.Tech.: Solid State Technology	PH617	Solid State Physics I	Core	4	
84	M.Tech.: Solid State Technology	PH618	Applied Quantum Physics	Core	4	
85	M.Tech.: Solid State Technology	PH635	Solid State Technology Lab I	Core	3	
86	M.Tech.: Solid State Technology	PH625	Solid State Physics II	Core	3	

87	M.Tech.: Solid State Technology	PH626	Device Physics and Nanoelectronics	Core	3	
88	M.Tech.: Solid State Technology	PH627	Computational Solid State Physics	Core	3	
89	M.Tech.: Solid State Technology	PH668	MEMS and MOEMS	Elective	3	
90	M.Tech.: Solid State Technology	PH670	Quantum Optical Communication	Elective	3	
91	M.Tech.: Solid State Technology	PH636	Solid State Technology Lab - II	Core	3	
92	M.Tech.: Solid State Technology	PH653	Seminar	Core	1	
93	M.Tech.: Solid State Technology	PH656	Comprehensive Viva	Core	1	
94	Ph.D.: Course Work - January	PH464	Optical Communication	Credited	3	
95	Ph.D.: Course Work - January	PH468	MEMS and MOEMS	Credited	3	
96	Ph.D.: Course Work - July	PH612	Opto Mechanical Design Analysis	Credited	3	
97	Ph.D.: Course Work - July	PH613	Optical Fabrication and Testing	Credited	3	
98	Ph.D.: Course Work - July	PH849	Molecular Quantum Mechanics	Credited	3	
99	Ph.D.: Course Work - July	PH832	Experimental Physics	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		

V Review on Teaching, Learning and Evaluation

Sl. No.	Criteria	Response based on criteria	Comments	Suggestions

1	Any innovative teaching methods/aids adopted?	Yes	Experimental demonstrations in theory courses, applets and video demonstrations, exercises to promote lateral thinking, working with real world data	
2	Is any e-learning modules developed?	Yes	Exams and Lecture videos on Moodle	
3	**Student evaluation procedure**			

Criteria	Response	Comments	Suggestions
Course evaluation	Internal		
Project evaluation	Internal		

4	**Evaluation components**			

Criteria	Response	Comments	Suggestions
Theory	Continuous assesment and end semester exam		
Lab	Continuous assesment and end semester exam Continuous assesment and course project Continuous assesment and end semester exam, Continuous assesment and course project		
Project/ Internship/ Seminar	Mid term evaluaion and final evaluation		

5	**Continuous Assessment Components**			

Theory	Quiz I Quiz II Others - End semester, Internal evaluation		
Lab	Class exercise evaluation End Semester Examination Class exercise evaluation & End Semester Examination short projects for evaluation in advanced labs		

6	Is there any remedial coaching to support weak performers?	Yes	Remedial classes for weak students	
7	Is academic feedback from students taken regularly?	Yes	Class committee meetings, course evaluation forms at the end of semester	

8	What are the steps taken based on student's feedback?	Class committee feedback: suggestions implemented in ongoing semester Course feedback: Teachers improve content and methods the next time course is taught Curriculum revised if recommended by students		
9	Is Class committee meetings conducted?	Yes Class committee meetings held after quiz 1 and quiz 2		

VI Department faculty credentials

Sl. No.	Criteria	Response	Comments	Suggestions
1	Percentage of faculty with PhD	100		
2	No. of journal articles published	6		
3	No. of books published	0		
4	No. of book chapters published	0		
5	No. of invited talks/ conferences/ workshops attended	7		
6	No. of research projects funded by IIST	2		
7	No. of research projects funded through ASRG/IIST-ISRO/DoS	6		
8	No. of externally funded research projects like CSIR, DST, DRDO etc.	6		
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	0		
13	No. of conference paper published	0		
14	No. of visits made by the faculty/student for research collaborations/invited talks/conferences abroad	8		
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 Payloads developed	SSPACE, Physics club, AHAN, OPTICA, SPIE student chapter, NIRMAN (social outreach), Yoga club	

Whether students are doing internship abroad?			
Whether students are doing internship at national academic institutes / universities?	Yes		
Whether students are doing internship at ISRO/ Industries/ R&D institutes?			
Whether the department conducts outreach programs?	Yes OPTICA, SPIE student chapter organise lectures		
Whether department has alumni activities?	No		

IX Details of placement/ higher studies of students

Criteria	UG	PG	PhD	Comments	Suggestions
No. of students placed	0	10	0		
No. of students opted for higher studies	0	1	0		
No. of students cleared GATE/ SLET/ NET/ CSIR/ UGC/ Others etc.	0	0	0		

X Infrastructure in the Department

Sl. No.	Criteria	Response	Comments	Suggestions
1	No. of classrooms	10		
2	No. of seminar/ conference rooms	1		
3	No. of instruction labs	7		
4	No. of research labs	8		
5	No. of full-fledged e-learning classrooms	10		
6	No. of computing labs	2		
7	Is there any lab with potential for centre of excellence?			
8	Is there any labs sponsored by external agency?			

9	Inter-disciplinary research facility			
10	Is there any common amenities like restroom, recreation club, etc.?	YES,r-209 RESTROOM		
11	Is there any facilities for differently abled?	yes, separate toilet, lift, wheel chair and wheelchair ramp		
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	Excellent
6.	The status of taking feedback from stakeholders and expert groups for revision and design of curriculum of a programme.	Student Faculty Alumni Employers Academic Peers
7.	The list of extension programmes conducted by the department	
8.	List Faculty Development Programme conducted (any programme aiming at updating the knowledge of faculty of the department).	
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.	Investigation and lab demonstration of feasibility of laser holography based surface profilometer for potential erosion measurement of ceramic liner of hall thruster (Prof. Umesh), Establishment of Laser Profilometry Based on Holographic Principle.(P

11.	Detail the mechanism adopted to help academically disadvantaged students to cope with academic requirements	Remedial classes, Mentorship, supplementary exam
12.	Detail the mechanism adopted to help students who perform very much below the class averages	Remedial classes, Mentorship, supplementary exam
13.	The total grant/revenue generated/received from different agencies by the department conducting research projects/consultancy services during the year.	15,737,213/- (2313437 SERB+13423776 DST)
14.	The suggestions to improve the efficiency and effectiveness of the IIST system.	Procurement process and external external project fund management are overly constrained. Policy needed for external project overhead funds. Simplification required for access to IIST by academic visitors.

XIII Strength of the Department (maximum 150 words)

Faculty with complementary research areas that can support each other's teaching and research work. Good research and teaching laboratory facilities. Overlapping activities for research, PG and UG students providing an opportunity to work together and learn. ISRO experts as guest faculty for teaching specific technical courses Excellent teaching with an average feedback of more than 80% for the department.

XIV Weakness of the Department (maximum 150 words)

Some areas of Physics not represented, e.g. high energy physics, soft condensed matter physics. Faculty strength below optimal as regards teaching load

XV Challenges (maximum 150 words)

Visibility as a department is less than optimum. Need better projection at a national level to attract talent. Limited availability of talent for research (PhD and Postdoctoral fellows) We are a science department both AICTE and UGC guidelines, leading to duplication of procedural efforts.

XVI Opportunities (maximum 150 words)

Collaboration with ISRO on cutting edge technological problems related to applications of Physics. Thus there is a fruitful exchange between industry and academics. Collaborations with international institutions. Resources for futuristic quantum technology research.

XVII Any other details relevant to the department

Final Recommendations

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. Sudheesh Chethil**, ~~Associate~~ Professor, Physics: .....

2 **Dr. Sooraj Ravindran**, Associate Professor, Avionics: .....

3 **Dr. Apoorva Nagar**, Associate Professor, Physics: .....

4 **Dr. Rajeev N Kini**, Associate Professor, IISER Thiruvananthapuram: .....

Approved by,

Dean Academics,
IIST

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