Indian Institute of Space Science and Technology

Thiruvananthapuram 695 547

Department of Physics

Academic Audit Report

2022-2023

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)	9
9	No. of Project Fellows	53
10	No. of Research Associates	0
11	No. of Post Doctoral Fellows	4

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	24	24	4	0	0.00
2	Dual Degree: Engineering Physics (B.Tech.)+ M.Tech./ Master of Science	II Year	22	22	3	0	0.00
3	Dual Degree: Engineering Physics (B.Tech.)+ M.Tech./ Master of Science	III Year	22	22	1	0	0.00
4	Dual Degree: Eng. Physics (B.Tech.)+ Optical Engineering(M.Tech.)	IV Year	20	0	0	0	0.00
5	Dual Degree: Eng. Physics (B.Tech.)+ Optical Engineering(M.Tech.)	V Year	20	4	0	4	100.00
6	Dual Degree: Eng. Physics (B.Tech.)+ Solid State Physics(Master of Science)	IV Year	20	0	0	0	0.00
7	Dual Degree: Eng. Physics (B.Tech.)+ Solid State Physics(Master of Science)	V Year	20	5	0	5	100.00
8	M.Tech.: Optical Engineering (Standalone)	I Year	16	0	0	0	0.00
9	M.Tech.: Optical Engineering (Standalone)	II Year	16	5	0	4	80.00

10	M.Tech.: Quantum Technology (Standalone)	I Year	11	6	2	0	0.00
11	M.Tech.: Quantum Technology (Standalone)	II Year	0	0	0	0	0.00
12	M.Tech.: Solid State Technology (Standalone)	I Year	0	0	0	0	0.00
13	M.Tech.: Solid State Technology (Standalone)	II Year	11	3	1	1	33.33
Total			202	91	11	14 .	

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.)	5095	0		
Dual Degree: Eng. Physics (B.Tech.)+ Solid State Physics (M.Tech.)	5095	0		
M.Tech.: Optical Engineering (Standalone)	101	0		
M.Tech.: Quantum Technology (Standalone)	88	6		
M.Tech.: Solid State Technology (Standalone)	0	0		

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	14	14	0	4
Total	14	14	0	4

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	Core	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	PH461	Optical Thin Films Science and Technology	Core	3	
24	Dual Degree: Optical Engineering	PH643	Quantum Optics and Quantum Communication	Core	3	
25	Dual Degree: Optical Engineering	PH441	Guided Wave Optics Lab	Core	1	
26	Dual Degree: Optical Engineering	PH442	Adaptive Optics Lab	Core	1	
27	Dual Degree: Optical Engineering	PH451	Seminar	Core	1	
28	Dual Degree: Solid State Physics	PH555	Project Phase II	Core	18	
29	Dual Degree: Solid State Physics	PH553	Project Phase I	Core	16	
30	Dual Degree: Solid State Physics	PH415	Advanced Solid State Physics	Core	4	
31	Dual Degree: Solid State Physics	PH416	Quantum Mechanics II	Core	4	
32	Dual Degree: Solid State Physics	PH417	Semiconductor Physics	Core	4	
33	Dual Degree: Solid State Physics	PH418	Experimental Physics	Core	3	
34	Dual Degree: Solid State Physics	PH475	Cold Atoms and Bose-Einstein Condensates	Elective	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 Physics	Core	4	
38	Dual Degree: Solid State Physics	PH425	Computational Physics	Core	3	
39	Dual Degree: Solid State Physics	PH421	Guided Wave Optics	Core	3	
40	Dual Degree: Solid State Physics	PH472	Quantum Many - Body Physics	Elective	3	
41	Dual Degree: Solid State Physics	PH643	Quantum Optics and Quantum Communication	Elective	3	

42	Dual Degree: Solid State Physics	PH461	Optical Thin Films Science and Technology	Elective	3	
43	Dual Degree: Solid State Physics	PH644	Quantum Metrology and Quantum Sensing	Elective	3	
44	Dual Degree: Solid State Physics	PH443	Solid State Physics Lab III	Core	1	
45	Dual Degree: Solid State Physics	PH453	Mini Project	Core	2	
46	Dual Degree: Solid State Physics	PH454	Comprehensive Viva Voce II	Core	2	
47	Dual Degree: Engineering Physics	PH311	Atomic and Molecular Spectroscopy	Core	4	
48	Dual Degree: Engineering Physics	PH312	Statistical Mechanics	Core	3	
49	Dual Degree: Engineering Physics	PH331	Modern Physics Lab	Core	2	
50	Dual Degree: Engineering Physics	PH321	Introduction to Solid State Physics	Core	3	
51	Dual Degree: Engineering Physics	PH361	Quantum Information Theory	Elective	3	
52	Dual Degree: Engineering Physics	PH425	Computational Physics	Elective	3	
53	Dual Degree: Engineering Physics	PH472	Quantum Many Body Physics	Elective	3	
54	Dual Degree: Engineering Physics	PH474	Atomic & Molecular Spectroscopy	Elective	3	
55	Dual Degree: Engineering Physics	PH341	Solid State Physics Lab	Core	1	
56	Dual Degree: Engineering Physics	PH351	Comprehensive Viva-Voce I	Core	3	
57	Dual Degree: Engineering Physics	PH211	Electrodynamics and Special Relativity	Elective	3	
58	Dual Degree: Engineering Physics	PH212	Mathematical Physics	Elective	4	
59	Dual Degree: Engineering Physics	PH213	Classical Mechanics	Elective	4	
60	Dual Degree: Engineering Physics	PH231	Optics Lab I	Core	1	
61	Dual Degree: Engineering Physics	PH221	Modern Optics	Elective	3	
62	Dual Degree: Engineering Physics	PH222	Quantum Mechanics	Core	4	

63	Dual Degree: Engineering Physics	PH241	Optics Lab II	Core	1	
64	Dual Degree: Engineering Physics	PH111	Physics I	Core	4	
65	Dual Degree: Engineering Physics	PH131	Physics Lab	Core	1	
66	Dual Degree: Engineering Physics	PH121	Physics II	Core	4	
67	M.Tech.: Thermal and Propulsion	PH634	Fundamentals of Quantum Mechanics	Audited	3	
68	M.Tech.: Optical Engineering	PH751	Project Phase I	Core	13	
69	M.Tech.: Optical Engineering	PH752	Comprehensive Viva	Core	2	
70	M.Tech.: Optical Engineering	PH754	Project Phase II	Core	20	
71	M.Tech.: Solid State Technology	PH755	Project Phase I	Core	14	
72	M.Tech.: Solid State Technology	PH757	Project Phase II	Core	18	
73	M.Tech.: Quantum Technology	PH634	Fundamentals of Quantum Mechanics	Core	3	
74	M.Tech.: Quantum Technology	PH635	Solid State Physics	Core	3	
75	M.Tech.: Quantum Technology	PH637	Electromagnetism and Optics	Core	3	
76	M.Tech.: Quantum Technology	PH638	Quantum Computation	Core	3	
77	M.Tech.: Quantum Technology	PH639	Experimental Techniques	Core	3	
78	M.Tech.: Quantum Technology	PH657	Quantum Technology Lab 1	Core	1	
79	M.Tech.: Quantum Technology	PH658	Quantum Simulation Lab	Core	1	
80	M.Tech.: Quantum Technology	PH643	Quantum Optics and Quantum Communication	Core	3	
81	M.Tech.: Quantum Technology	PH644	Quantum Metrology and Quantum Sensing	Core	3	
82	M.Tech.: Quantum Technology	PH645	Physics of Information	Core	3	
83	M.Tech.: Quantum Technology	PH646	Quantum Materials and Devices	Core	3	

84	M.Tech.: Quantum Technology	PH711	Atomic and Molecular Spectroscopy	Elective	3	
85	M.Tech.: Quantum Technology	PH647	Quantum Technology Lab 2	Core	1	
86	M.Tech.: Quantum Technology	PH648	Quantum Technology Lab 3	Core	1	
87	M.Tech.: Quantum Technology	PH649	Seminar	Core	1	
88	Ph.D.: Course Work - January	PH461	Optical Thin Films Science and Technology	Credited	3	
89	Ph.D.: Course Work - January	PH643	Quantum Optics and Quantum Communication	Credited	3	
90	Ph.D.: Course Work - January	PH424	Advanced Statistical Physics	Credited	3	
91	Ph.D.: Course Work - January	PH644	Quantum Metrology and Quantum Sensing	Credited	3	
92	Ph.D.: Course Work - January	PH832	Experimental Physics	Credited	3	
93	Ph.D.: Course Work - July	PH411	Optical Engineering Fundamentals	Credited	0	
94	Ph.D.: Course Work - July	PH419	Fourier Optics	Credited	0	
95	Ph.D.: Course Work - July	PH637	Electromagnetism and Optics	Credited	0	
96	Ph.D.: Course Work - July	PH638	Quantum Computation	Credited	0	
97	Ph.D.: Course Work - July	PH417	Semiconductor Physics	Credited	0	
98	Ph.D.: Course Work - July	PH418	Experimental Physics	Credited	0	
99	Ph.D.: Course Work - July	PH814	Mathematical Physics	Credited	0	
100	Ph.D.: Course Work - July	PH819	Molecular Quantum Mechanics	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 Videos for experiment demonstrations	
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	19		
3	No. of books published	1		
4	No. of book chapters published	1		
5	No. of invited talks/ conferences/ workshops attended	1		
6	No. of research projects funded by IIST	0		
7	No. of research projects funded through ASRG/IIST-ISRO/DoS	10		
8	No. of externally funded research projects like CSIR, DST, DRDO etc.	10		
9	No. of patents published/awarded	0		
10	No. of patents filed	0		
11	No. of faculty/student awards received	5		
12	No. of conferences/Workshops/seminars/Colloquium Organized	11		
13	No. of conference paper published	13		
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 Payload 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	9	0		
No. of students opted for higher studies	0	0	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?	No
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.	Development of atomic layer deposition system funded by dept of science and technology (Prof. Jinesh), High-Q dielectric thin films,Establishment of Laser Profilometry Based on Holographic Principle.(Prof. Dinesh)
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.	85174000/-
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. Focus area of quantum technology.

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

More faculty may be hired in view of the newly started quantum technology programme and the high teaching load. More postdoctoral fellowships should be made avaiable to the department and there should be a rolling advertisement for the hiring of postdocs. There should be a rolling advertisement for PhD positions for candidates who have external scholarships or funding.

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: ..... 31 JUL 2024

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