Interdisciplinary Dual Degree in Quantum Science and Technology (QuST)

The 6 th /7 th Semester B.Tech students are eligible for up gradation to five year Inter Disciplinary Dual Degree (B.Tech & M.Tech) program.

Along these lines, we would like to propose offering a DD Program on Quantum Science and Technology (QuST). Given the widespread interest in quantum computing and information today, both in academia and increasingly in industry, we are hopeful that such a program will attract a fair number of students from EE, MME, ME, CS departments in addition to EP students.

The students have to opt for four electives (36 credits) from the list of electives in advanced materials and nano sciences across different departments

List of courses for DD in Quantum Science and Technology

There will be **four core courses** that include a course on Quantum Computation and Quantum Information, an ID course on Experimental Techniques for Quantum Computation and Metrology, a course on Quantum Electronics and Lasers and a course on Optical Signal Processing and Quantum Communications. (**36 credits** of DD core courses).

The core component also includes a project during the 9th and 10th semesters worth **85 credits.**

Semester VII

Sl. No	Course No	Course Name	L	T	E	P	O	C
1	PH5840	Core 1: Quantum Computation and Quantum Information	3	0	0	0	6	9
2	EE4348	Core 2: Quantum Electronics and Lasers (Includes a 3-credit lab component)	3	0	3	0	6	12
		Total Credits :	**6**	**0**	**3**	**0**	**12**	**21**

Semester VIII

Sl. No	Course No	Course Name	L	T	E	P	O	C
1	ID5843	Experimental Techniques for Quantum Computation and Metrology	3	0	0	0	6	9
2	EE6502	Optical Signal Processing and Quantum Communications	3	0	0	0	6	9
3	Elective I	To be selected from the given list of courses	3	0	0	0	6	9
4	Elective II	To be selected from the given list of courses	3	0	0	0	6	9
		Total Credits :	**12**	**0**	**0**	**0**	**24**	**36**

Semester IX

Sl. No	Course No	Course Name	L	T	E	P	O	C
1	ID5790	Project – I (Summer)	0	0	0	0	25	25
2	ID5791	Project – II	0	0	0	0	20	20

3	Elective III	To be selected from the given list of courses	3	0	0	0	6	9
4	Elective IV	To be selected from the given list of courses	3	0	0	0	6	9
		Total Credits :	**6**	**0**	**0**	**0**	**57**	**63**

Semester X

Sl. No	Course No	Course Name	L	T	E	P	O	C
1	ID5792	Project – III	0	0	0	0	40	40
		Total Credits :	**0**	**0**	**0**	**0**	**40**	**40**

Total credits for the DD program: 160 Credits

(39 Core + 36 Electives + 85 Project)

Elective Courses

(A) Set of relevant electives that are already offered by the **physics** department:

- PH 5842 Advanced Topics in Quantum Information
- PH 5170 Quantum Mechanics – II
- PH 5620 Coherent and Quantum Optics
- PH 5480 Advanced Statistical Physics
- PH 5680 Superconductivity and applications
- PH 5500 Dynamical Systems
- PH 5815 Ultrafast Lasers and Applications

(B) Set of relevant courses (both core and electives) that are already offered by the **EE** department:

- EE5120: Linear Algebra
-EE5142: Introduction to Information and Coding theory
- EE5160: Error control coding
- EE5347: Electronic and Photonic Nanoscale Devices
- EE6500: Integrated Optoelectronic Devices and Circuits
- EE6700: Advanced Photonics Laboratory
- EE7500: Advanced topics in RF and Photonics

(C) Courses from Math and CS departments which can also be a part of the elective list for this program:

- MA5310: Linear Algebra
- CS5011: Introduction to Machine Learning
- CS6111: Foundations of cryptography
- CS7111: Advanced Topics in Cryptography

Students can choose either EE5120: Linear Algebra, or MA5310: Linear Algebra, but not both