

Revised structure and ordering of the subjects.

2-1

- Electricity and Magnetism (PH-202M)(Currently in 2-2 , shifted because it covers the fundamentals of electromagnetic concepts and waves which are useful to other courses like Optics and Special Theory of Relativity
- Elements of Classical Mechanics (Currently in 3-2, should be put here as its fundamental and better understanding comes for many courses that come before)
- Computational Physics (Currently in 4-1. Very light as Programming course done in 1st year (Numerical Analysis of the Mathematics Department in 2-2 is better understood with tools such as MATLAB. This course can replace the current Computer Graphics course as the same theory contents can be taught in this course itself. Moreover, Computer Graphics course lab component is not vast enough to give benefits to Physics students and can be easily integrated with better scheme in the Computational Physics course)
- Complex Analysis and Partial Differential Equations (same as before)
- Physical Chemistry (same as before)
- Economics (HS-201) (same as before)

2-2

- Optics (Currently in Second Year, First Semester, the course should be shifted here because it would be more insightful after studying the course on Electricity and Magnetism. At such a stage, introduction to Optics using Matrix analysis can also be added to the course.)
- Quantum Physics (Currently in Third Year, First Semester; shifting this course here will give a timely introduction to the wave mechanical formulation of Quantum Mechanics and will also allow for better placement of other higher stages of Quantum Mechanics Courses later in third and fourth year. It will also be more useful running parallel with the Mathematics course on Linear Algebra (suggested below) to add more meaning to operator algebra.)
- Linear Algebra (instead of geosciences Geoscience which currently runs in 2-1) (Linear Algebra runs currently in 2-2 for math students. This course could be added to the curriculum of the Physics students as well, since Linear Algebra is a very essential)
- Numerical Analysis(same as before)
- Organic Chemistry (same as before)
- Basic Concepts of Business Management and Practices (BM-201) (same as before)

3-1

- Quantum Mechanics-1 (currently in 4th year of Int MSc)
- Mathematical Physics-1 (its importance comes in all the courses and should be done earlier than now, which is 4th year- 1st semester)
- Thermal Physics (Now that we have done classical mechanics and quantum physics, a proper relevance of studying thermodynamic concepts is visible and the part of introduction to statistical mechanics can be appreciated)
- Thermodynamics and Surface Chemistry (instead of Inorganic Chemistry- this is more related to Physics curriculum and thus, if there is a bound to take course from chem. Department, then this course or other course more relevant from physics point of view should be taken)
- Introduction to Relativity (with tensor notation)
- Human Science Elective (same as before)
- Laboratory work (currently very less of Lab experiments, easily completed in first few weeks)

3-2

- Elements of Condensed Matter Physics (Now this is a much more relevant course as we have taken important Quantum Mechanics and Classical Mechanics course and are taking Statistical Mechanics course)
- Statistical Mechanics (currently in 4-2)
- Atomic Physics (Now better understood as Quantum Mechanics is done)
- Nuclear Physics (Some additional concepts can be understood as pre-requisites done)
- Human Science Elective (same as before)
- Quantum Mechanics-2 (currently in 4-2)

Now Departmental Electives can be taken at this stage in 4th year as many pre-requisites have been done. Courses in italic font are those that can be done along with MSc students of the same year.

4-1

- *Semiconductor Devices* (same as before)
- *Classical Mechanics-1* (same as before)
- *Classical Electrodynamics* (same as before)
- Plasma Physics (currently is in 3-2 but can be shifted here)
- Fluid Mechanics (this course runs in Mechanical Engg Dept and can be taken instead of the current Properties of Matter course in 3-1, or the Properties of Matter course can be renewed to contain some new stuff such as fluid mechanics etc..)
- Physics Departmental Elective (currently in 5th year)

4-2

- Departmental Physics Elective (currently in 5th year)
- *Nuclear and Particle Physics* (same as before)
- *Atmospheric Physics* (same as before)
- *Laboratory Work-II* (same as before)
- *Condensed Matter Physics* (same as before)
- *Molecular Spectroscopy* (same as before)

5th year : thesis work along with few electives as follows

- *Departmental Physics Elective-1*
- *Departmental Physics Elective-2*
- *Departmental Physics Elective-3*
- *Departmental Physics Elective-4*
- *Engineering Science Elective*

On the next page, you can find the curriculum of IIT Kanpur Integrated MSc course and MSc course. After that ,old and new curriculum of IIT Roorkee Integrated MSc can be found in table format.

STRUCTURE OF THE INTEGRATED M. Sc. (Five Year) PROGRAMME

sem	FIRST	SECOND	THIRD	FOURTH	FIFTH
	CHM101 PHY101 PHY102	PHY103 MTH102 TA101	MTH203 CHM201 ESO212/ ESO214	HSS-I-2 TA201 PHY204	PHY315 PHY401 PHY421
	MTH101 ESC101 PE101 HSS-I-1/ ENG112	ESC102 PHY100 PE102	PHY210 ESO-2 PHY224	PHY431 PHY218	†

sem	SIXTH	SEVENTH	EIGHTH	NINTH	TENTH
	PHY412 PHY422 PHY432	PHY461 PHY543 PHY552	PHY462 PHY524 PHY553	PHY563 PHY565 † † †	PHY566 PHY568 † † †
	† †	† †	† †	† †	† †

† IN ADDITION TO ABOVE THE STUDENT MUST COMPLETE:

DE 07 CREDITS
 OE 27 CREDITS
 HSS-2 08 CREDITS
 NDE 08 CREDITS

CHM 201	General Chemistry-I	PHY 224	Optics
E S O #	Engineering Sc. Option	PHY 204	Quantum Physics
ESO 212	Fluid Mechanics	PHY 210	Thermal Physics
ESO 214	Nat. & Prop. of Materials	PHY 218	Optics Laboratory
H S S	Hum. & Social Sciences	PHY 315	Modern Physics Laboratory
TA 201	Manufacturing Processes	PHY 401	Classical Mechanics
DE-I & II	Departmental Electives*	PHY 412	Statistical Mechanics
NDE	Non-Dept. Elective	PHY 421	Mathematical Methods I
O E	Open Elective (any course in any Dept.)	PHY 422	Mathematical Methods II
		PHY 431	Quantum Mechanics I
		PHY 432	Quantum Mechanics II
		PHY 461	Experimental Physics I
		PHY 462	Experimental Physics II
		PHY 524	Intro to Atomic & Nucl Physics
		PHY 552	Classical Electrodynamics I
		PHY 553	Classical Electrodynamics II
		PHY 563	Experimental Project I
		PHY 565	Experimental Project II
		PHY 566	Experimental Project III
		PHY 568	Experimental Project IV

Engineering Science options must be chosen from the list of courses as advised by the Convener, DUGC

**STRUCTURE OF THE M. Sc. (Two Year) AND THE
M.Sc.-Ph.D. (DUAL DEGREE) PROGRAMMES**

M. Sc. (Two Year)

YEAR I		YEAR II	
Sem I	Sem II	Sem III	Sem VI
PHY 401	PHY 412	PHY 543	PHY 524
PHY 421	PHY 422	PHY 552	PHY 553
PHY 431	PHY 432	PHY 563	PHY 566
PHY 441	PHY 462	PHY 565	PHY 568
PHY 461	PHY 473	PHY ***	PHY ***
			PHY ***

† IN ADDITION TO ABOVE THE STUDENT MUST COMPLETE
DE 11 CREDIT

M.Sc.-Ph.D. (DUAL DEGREE)
(For Admission in 2008-09)

YEAR I		YEAR II		YEAR III	
Sem I	Sem II	Sem III	Sem V	Sem IV	V
PHY 400	PHY 412	PHY 543	PHY 553	PHY 599N	PHY 422 or PHY 692
PHY 401	PHY 432	PHY 552	PHY 524	PHY ***	PHY 599N
PHY 421	PHY 461	PHY 462	PHY 502N	PHY ***	PHY ***
PHY 431	PHY 473	PHY 501	PHY ***		
PHY 441	PHY 500				

PHY 400	Introduction to the Department	PHY 224	Optics
PHY 401	Classical Mechanics	PHY 461	Experimental Physics I
PHY 412	Statistical Mechanics	PHY 462	Experimental Physics II
PHY 421	Mathematical Methods I	PHY 563	Experimental Project I
PHY 422	Mathematical Methods II	PHY 565	Experimental Project I
PHY 431	Quantum Mechanics I	PHY 566	Experimental Project III
PHY 432	Quantum Mechanics II	PHY 568	Experimental Project IV
PHY 441	Electronics	PHY 500	M.Sc. Experimental Project I
PHY 473	Computational Physics	PHY 501	M.Sc. Experimental Project II
PHY 524	Intro to Atomic & Nucl Physics	PHY 502	M.Sc. Experimental Project III
PHY 543	Condensed Matter Physics	PHY 599N	M.Sc. Research Project
PHY 552	Classical Electrodynamics I	PHY 799	Research Credits
PHY 553	Classical Electrodynamics II		
PHY ***	Departmental Elective*		

* One of PHY 407 (Special & General Relativity) and PHY 680 (Particle Physics) must be taken as DE courses; the other can be any Departmental elective.

† Engineering Science options must be chosen from the list of courses as advised by the Convener, DUGC

Current Integrated MSc Curriculum IIT Roorkee

1 st semester	2 nd semester	3 rd semester	4 th semester	5 th semester
MA-101	MA-102	CE-201	BM-201	PH-307
PH-101	CY-101	HS-201	ES-201	PH-305
EE-101	EC-102	PH-201M	CY-203M	PH-301
EC-101A/B	CE-101	CY-201M	PH-202M	PH-303
MI-102	MI-101	CY-202M	MA-202M	HSE
BT-101	CE-102	MA-201M	MA-204M	
HS-101	HS-102	PH-211		

6 th semester	7 th semester	8 th semester	9 th semester	10 th semester
PH-202	PH-501	PH-502	PH ELE-1	PH ELE-6
PH-306	PH-507	PH-504	PH ELE-2	PH-610
PH-304	PH-509	PH-510	PH ELE-3	PH-608
PH-308	PH-503	PH-512	PH ELE-4	
HSE	PH-505	PH-514	PH ELE-5	
	PH-511	PH-508	Inst ELE	
		PH-506		

MA-101	Mathematics-I	CE-201	Computer Aided Graphics
PH-101	Physics-I	HS-201	Economics
MI-102	Manufacturing Techniques	PH-201M	Optics
EE-101	Electrical Science	CY-201M	Physical Chemistry-I
HS-101	Technical Communication	CY-202M	Basic Inorganic Chemistry
BT-101	Fundamentals of Biotechnology	MA-201M	Complex Analysis and Partial Differential Equations
EC-101A	Computer Systems and Programming	PH-211	Introduction to Special Relativity
EC-101B	Fundamentals of Object Oriented Programming	BM-201	Management Concepts and Practices
CY-101	Chemistry-I	ES-201	Introduction to Geo-Science
MA-102	Mathematics-II	CY-203M	Organic Chemistry-I
EC-102	Fundamentals of Electronics	PH-202M	Electricity and Magnetism
CE-101	Engineering Graphics	MA-202M	Numerical Analysis
MI-101	Thermodynamics	MA-204M	Linear Algebra
CE-102	Environmental Studies	PH-301	Plasma Physics
HS-102	Behavioural Science	PH-303	Quantum Physics

PH-305	Properties of Matter and Acoustics	PH-511	Computational Physics
PH-307	Atomic Physics	PH-502	Laboratory-II
HSE	Human Science Elective	PH-504	Condensed Matter Physics
PH-202	Lab Work-I	PH-506	Statistical Physics
PH-304	Elements of Condensed Matter Physics	PH-508	Quantum mechanics-II
PH-306	Elements of Classical Mechanics	PH-510	Nuclear and Particle physics
PH-308	Elements of Nuclear Physics	PH-512	Physics of Earth's Atmosphere
PH-501	Semiconductor Devices	PH-514	Molecular Spectroscopy
PH-503	Quantum Mechanics-I	PH-608	Seminar
PH-505	Mathematical Physics	PH-610	Dissertation
PH-507	Classical Electrodynamics	PH ELE	Departmental Physics Elective
PH-509	Classical physics	Inst ELE	Institute Elective

Proposed Integrated MSc Curriculum IIT Roorkee

1st semester	2 nd semester	3 rd semester	4 th semester	5 th semester
MA-101	MA-102	PH-202M	PH-201M	PH-503
PH-101	CY-101	MA-201M	MA-204M	PH-505
EE-101	EC-102	CY-201M	BM-201	PH-212
EC-101A/ EC-101B	CE-101	HS-201	CY-203M	Thermodynamics and Surface Chemistry (CY Dept)
MI-102	MI-101	PH-306	MA-202M	PH -211
BT-101	CE-102	PH-511	PH-303	HSE
HS-101	HS-102			PH-302

6 th semester	7 th semester	8 th semester	9 th semester	10 th semester
PH-304	PH-501	PH ELE	PH ELE-1	PH-608
PH-506	PH-507	PH-510	PH ELE-2	PH-610
PH-307	PH-509	PH-512	PH ELE-3	
PH-308	PH-301	PH-502	PH ELE-4	
PH-508	MI-263	PH-504	ESE	
HSE	PH ELE	PH-514		

PH-101	Physics-I	MA-202M	Numerical Analysis
MA-101	Mathematics-I	PH-303	Quantum Physics
MI-102	Manufacturing Techniques	PH-211	Introduction to Relativity (with Tensor Notation)
BT-101	Fundamentals of Biotechnology	PH-212	Thermal Physics
EC-101A	Computer Systems and programming	PH-302	Laboratory-I
EC-101B	Fundamentals of Object oriented Programming	PH-503	Quantum Mechanics-I
HS-101	Technical Communication	PH-505	Mathematical Physics
EE-101	Electrical Science	HSE	Human Science Elective
CY-101	Chemistry-I	PH-304	Elements of Condensed Matter Physics
CE-101	Engineering Graphics	PH-307	Atomic Physics
CE-102	Environmental Studies	PH-308	Elements of Nuclear Physics
MA-102	Mathematics-II	PH-506	Statistical Physics
EC-102	Fundamentals of Electronics	PH-508	Quantum Mechanics-II
HS-102	Behavioural Science	PH-501	Semiconductor Devices
MI-101	Thermodynamics	PH-507	Classical Electrodynamics
CY-201M	Physical Chemistry-I	PH-509	Classical Physics
MA-201M	Complex Analysis and partial Differential Equations	PH-263	Fluid Mechanics
PH-202	Lab Work-I	PH-301	Plasma Physics
HS-201	Economics	PH-502	Laboratory-II
PH-306	Elements of Classical Mechanics	PH-504	Condensed Matter Physics
PH-511	Computational Physics	PH-510	Nuclear and Particle Physics
PH-201M	Electricity and Magnetism	PH-512	Physics of Earth's Atmosphere
MA-204M	Linear Algebra	PH-514	Molecular Spectroscopy
BM-201	Management Concepts and Practices	PH-608	Seminar
CY-203M	Organic Chemistry-I	PH-610	Dissertation
ESE	Engineering Science Elective	PH ELE	Departmental Physics Elective