Integrated PhD

Program Structure 2025

IISER

THIRUVANANTHAPURAM

General Structure for the IPhD Program

<table>
<tr><th>Semester 1</th><th>Semester 2</th><th>Semester 3</th><th>Semester 4</th><th>Semester 5</th><th>Semester 6</th></tr>
<tr><td>3 credits</td><td>3 credits</td><td>3 credits</td><td>3 credits</td><td rowspan="7">Research phase I</td><td rowspan="7">Research phase II</td></tr>
<tr><td>3 credits</td><td>3 credits</td><td>3 credits</td><td>3 credits</td></tr>
<tr><td>3 credits</td><td>3 credits</td><td>3 credits</td><td rowspan="5">Project
Phase II
12 credits</td></tr>
<tr><td>3 credits</td><td>3 credits</td><td>3 credits</td></tr>
<tr><td>3 credits</td><td>3 credits</td><td rowspan="3">Project Phase I
6 credits</td></tr>
<tr><td>3 credits</td><td>3 credits</td></tr>
<tr><td>18</td><td>18</td><td>18</td><td>18</td><td>20</td><td>20</td></tr>
</table>

- Additionally, 8 credits for SEC/AEC distributed over the first 4-semesters.
- **Minimum credit requirement 120**

Biological Sciences Structure for the IPhD Program

<table>
<tr><th>Semester 1</th><th>Semester 2</th><th>Semester 3</th><th>Semester 4</th><th>Semester 5</th><th>Semester 6</th></tr>
<tr><td>MSB 401
Structural Biology [3003]</td><td>MSB 407
Advanced Genetics &
Genome Biology [3003]</td><td>MSB 501
Developmental Biology [3003]</td><td>MSB 504
Bioinformatics [3003]</td><td rowspan="7">Research Phase I</td><td rowspan="7">Research Phase II</td></tr>
<tr><td>MSB 402
Immunology [3003]</td><td>MSB 408
Physiology [3003]</td><td>MSB 502
Biostatistics [3003]</td><td>DSE IV [3003]</td></tr>
<tr><td>MSB 403
Cell Biology [3003]</td><td>MSB 409
Biochemistry [3003]</td><td>MSB 503
Advanced Biology Lab III
[0093]</td><td rowspan="4">Project
Phase II
12 credits</td></tr>
<tr><td>MSB 404
Ecology & Evolution
[3003]</td><td>MSB 410
Molecular Biology
[3003]</td><td>DSE III [3003]</td></tr>
<tr><td>MSB 405
Advanced
Biology Lab I [0093]</td><td>MSB 411
Advanced
Biology Lab II [0093]</td><td rowspan="2">Project Phase I
6 credits</td></tr>
<tr><td>DSE I [3003]</td><td>DSE II [3003]</td></tr>
<tr><td>18</td><td>18</td><td>18</td><td>18</td><td>20</td><td>20</td></tr>
</table>

1. DSE I and II – 300/400 levels and DSE III and IV – 400 or higher level
2. One of the DSE can be substituted with a GE or OE at a 400 or higher level

Core and Electives = 72 + 40 Credits
SEC and AEC = 8 Credits
Min. requirement 120 Credits

Biological Sciences – Additional Notes

AEC/SEC Courses:

Course	Semester	AEC/SEC	Credits
Biosafety and Regulations	1st	AECC	1
Seminar course (applicable for MSc only)	2nd	AECC	1
Scientific presentation for life sciences	3rd	SEC	1
Scientific writing	4th	SEC	1
Summer internship (applicable for MSc only)*	Summer break	AEC	2
Lab rotations (applicable for IPHD only)*#	Summer/Winter break	AEC	3

*Graded as Satisfactory or Unsatisfactory.
#Lab rotations for IPhD require supervisor/SCPP/HOD approval. Each rotation is for a minimum of 4 weeks, and a maximum of 4 rotations can be credited.

Chemical Sciences Structure for the IPhD Program

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
MSC 401: Organometallic Chemistry [3003] #	MSC 406: Advanced Physical Chemistry [3003] #	MSC 505: Advanced Chemistry Lab III (Inorganic & Organic Lab) [0093] #	5XXX: DSE 5/GE$ (from list B courses) [3003]	Research Phase I	Research Phase II
MSC 402: Advanced Coordination Chemistry [3104]	MSC 407: Main Group Chemistry [3003]	5XXX: DSE 2/GE$ (from list A courses) [3003]	5XXX: DSE 6/GE$ (from list B courses) [3003]		
MSC 403: Concepts in Organic Synthesis [3104]	MSC 501: Instrumental Methods for Structure Determination [3003] #	5XXX: DSE 3/GE$ (from list A courses) [3003]	Project Phase II 12 credits		
MSC 404: Quantum Chemistry [3003] #	MSC 502: Advanced Organic Chemistry-I [3003] #	5XXX: DSE 4/GE$ (from list A courses) [3003]			
MSC 405: Advanced Chemistry Lab I (Inorganic & Physical Lab) [0093] #	MSC 503: Chemical and Statistical Thermodynamics [3003] #	Project Phase I 6 credits			
DSE 1 MSC 4101: Biosystems [2002] (or) MSC 4102: Mathematics for Chemistry [2002]	MSC 504: Advanced Chemistry Lab II (Organic & Physical Lab) [0093] #				
19	**18**	**18**	**18**	**20**	**20**

Core and Electives = 73 + 40 Credits
SEC and AEC = 8 Credits
Min. requirement 121 Credits

#Individual-centric reading projects/problem solving/quiz/assignments/literature analysis at the discretion of the course instructor.

$Maximum one GE (at a 400 or higher level) is allowed, while GE is not mandatory.

Chemical Sciences – Additional Notes

List A Elective Courses

1. 5XXX: Advanced Organic Chemistry-II [3003]
2. 5XXX: Solid-State Chemistry [3003]
3. 5XXX: Advanced Quantum Chemistry [3003]
4. 5XXX: Theoretical Spectroscopy [3003]
5. Additional courses

List B Elective Courses

1. 5XXX: Physical Organic Chemistry [3003]
2. 5XXX: Frontiers in Inorganic Chemistry [3003]
3. 5XXX: Chemical Kinetics and Dynamics [3003]
4. Additional courses

List of SEC/AEC Courses

1. Management of Innovation Projects
2. Drug Discovery
3. Communication Skill Development
4. Glass blowing and workshop training
5. Summer Internship

Mathematical Sciences Structure for the IPhD Program

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
MSM 401 Metric Spaces [3 0 0 3]	MSM 501 Measure Theory [3 0 0 3]	MSM 511 Multivariable Analysis [3 0 0 3]	MSM 601 Curves and Surfaces [3 0 0 3]	Research Phase I	Research Phase II
MSM 402 Abstract Algebra [3 0 0 3]	MSM 502 Galois Theory [3 0 0 3]	MSM 512 Functional Analysis [3 1 0 4]	MSM 60XX DSE 5 List D Course 1		
MSM 403 Complex Analysis [3 0 0 3]	MSM 503 Theory of Ordinary Differential Equations [3 0 0 3]	MSM 513 Partial Differential Equations [3 1 0 4]	MSM 60XX DSE 6 List D Course 2		
MSM 404 Linear Algebra [3 0 0 3]	MSM 504 Topology [3 0 0 3]	MSM 514 Commutative Algebra [3 1 0 4]	MSM 60XX DSE 7 List D Course 3		
MSM 405 Numerical Analysis [3 0 0 3]	MSM 505 Probability theory & Stochastic Processes [3 0 0 3]	MSM 50XX DSE 3 List C Course 1	Project 6 credits		
MSM 40XX DSE 1/GE 1 [3 0 0 3]	MSM 50XX DSE 2 Mathematical Statistics/Data Structures [3 0 0 3]	MSM 50XX DSE 4/GE 2 List C Course 2			
18	**18**	**21**	**18**	**20**	**20**

Core and Electives = 75 + 40 Credits
SEC and AEC = 5 Credits
Min. requirement 120 Credits

Mathematical Sciences – Additional Notes

DSE for MSc/IPhD: To be chosen from the SoM only in consultation with the SCUP/SCPP and the course instructor.

GE for MSc/IPhD: 3 credits of GE is compulsory. Crediting more than 3 credits requires approval of the SCUP/SCUP.

*The Lab course, namely MSM 50XX [SDC2] - Math. Stat./Data Struct. Lab [0 0 2 1], of the corresponding Theory course MSM 50XX DSE 2 - Mathematical Statistics/Data Structures [3 0 0 3] needs to be chosen.

List C Elective Courses (400/500 level)

1. MAT 5xxx - Representation theory [3 0 0 3] [Sem 3]
2. I2M 403/MAT 4xxx - Applied Stochastic Analysis [3 0 0 3] [Sem 3]
3. I2M 404 and I2M 405/MAT 4xxx - Numerical Solutions of Differential Equations and NSDE Lab [2 0 1 3] [Sem 3]

List D Elective Courses (500/600 level)

1. MAT 5xxx - Fourier Analysis [3 0 0 3] [Sem 4]
2. MAT 6xxx - Sobolev Spaces [3 1 0 4] [Sem 4]
3. MAT 5xxx - Algebraic Topology [3 0 0 3] [Sem 4]
4. MAT 5xxx - Computational Fluid Dynamics [3 0 0 3] [Sem 4]
5. MAT 5xxx - Finite Element Method [3 0 0 3] [Sem 4]

List of SEC/AEC Courses

1. MSM 40XX - Mathematics Lab [0 0 2 1] [compulsory SEC Sem 1]
2. MSM 50XX - Math. Stat./Data Struct. Lab* [0 0 2 1] [compulsory SEC Sem 2]
3. Research Methodology - [compulsory SEC Sem 4 for IPhD Students]
4. Vedic Mathematics
5. History and Philosophy of Science
6. Science Communication
7. Indian Culture and Heritage
8. Reading Seminar

Physical Sciences Structure for the IPhD Program

<table>
<tr><th>Semester 1</th><th colspan="2">Semester 2</th><th>Semester 3</th><th>Semester 4</th><th>Semester 5</th><th>Semester 6</th></tr>
<tr><td>MSP 412 [3003]
Classical Mechanics</td><td colspan="2">MSP 421 [3003]
Statistical Mechanics</td><td>MSP 512 [3003]
Condensed Matter II</td><td>DSE III
(3 Credits, Level 5 or higher)</td><td rowspan="7">Research Phase I</td><td rowspan="7">Research Phase II</td></tr>
<tr><td>MSP 422 [3003]
Condensed Matter Physics I</td><td colspan="2" rowspan="2">MSP 415 [0093]
Advanced Physics Lab III</td><td rowspan="2">MSP 511 [3003]
Nuclear and Particle Physics</td><td>DSE IV
(3 Credits, Level 5 or higher)</td></tr>
<tr><td>MSP 424 [3003]
Numerical Methods</td><td rowspan="5">Project Phase II
12 credits</td></tr>
<tr><td rowspan="2">MSP 427 [3003]
Quantum Mechanics II</td><td rowspan="2">MSP 4001 [3003]
Electrodynamics</td><td rowspan="2">MSP 4002 [3003]
Classical Electrodynamics</td><td>MSP 523 [1063]
Modeling Materials</td></tr>
<tr><td>DSE-II
(3 Credits, Level 5 or higher)</td></tr>
<tr><td>MSP 428 [3003]
Math. methods in Physics - I</td><td>MSP 4205 [3003]
Elec. Devices & comp. interfacing</td><td>MSP 4004 [3003]
Quantum Mechanics III</td><td rowspan="3">Project Phase I
6 credits</td></tr>
<tr><td rowspan="2">MSP 425 [0093]
Adv. Physics Lab II</td><td>MSP 4011 [3003]
Experimental Methods</td><td>MSP 4003 [3003]
Mathematical Methods II</td></tr>
<tr><td colspan="2">DSE I (3 credits, Level 4 or higher)</td></tr>
<tr><td>18</td><td colspan="2">18</td><td>18</td><td>18</td><td>20</td><td>20</td></tr>
</table>

Core and Electives = 72 + 40 Credits
SEC and AEC = 8 Credits
Min. requirement 120 Credits

Physical Sciences – Additional Notes

List of SEC/AEC Courses

1. Engineering drawing & Design
2. History of Science
3. Science Communication
4. Foundation course on Indian Culture and Heritage
5. Seminar
6. Summer Internship