

## Applicable from Monsoon Semester 2024-25

### The Minors Program

The minors program allows students to claim recognition for a second specialization other than the majors. This can be done by taking a set of courses in the area. Details of the program are as follows.

- All courses for minors and specializations are to be taken as open electives.
- The list of minors/specializations and the courses for each of these is given below along with the credit requirements. Please note that basket of courses for some of the minors/specializations has a few mandatory courses.
- A student may apply for a minor at any stage between the award of majors and the beginning of the        th semester. This application is optional.
- Students need to claim the minor by filling out a form before the end-semester exams during their last semester.
- Students need to have a CPI        6.0 at the time of application and claiming the minor.
- A given course cannot count towards two requirements. Thus a course taken for a minor cannot be counted towards any other mandatory requirement for graduation.
- Students need to have a CPI        6.0 in the courses for minors and no F grades in this set of courses in order to qualify for the minor.

## List of Minors and Specializations

The complete list of minors is given below.

All minors require 16 credits from courses within the minors basket with the exception of *Earth and Environmental Sciences* that requires 20 credits.

Information about courses approved for each minor and other details may be obtained from the relevant coordinators.

CPI requirement to claim Minor or Specialization = 6.0 or above.

(Prevailing Senate Guidelines will apply).

The updated list will be applicable to

(a) students just starting to take minors

or

(b) who have some remaining courses yet to select and to complete the minors.

For the old students who had already taken (credited) the previously offered courses (up to Spring semester 2024) as per the previous list (<https://www.iisermohali.ac.in/course-structure>), will be eligible to claim the minors with those courses already credited.

### Coordinators:

Prof. N. G. Prasad (Biology and for Science Education)

Dr. Chetan Balwe (Mathematics)

Dr. Angshuman Roy Choudhury and Dr. Arijit De (Chemistry)

Dr. Raju Attada (Atmospheric Sciences)

Dr. Sourabh Bhattacharya (Earth Sciences)

Dr. Yunus Ali Pulpadan (Environmental Sciences)

Dr. Anoop Ambili (Earth and Environmental Sciences)

Dr. Kinjalk Lochan (Physics)

Dr. Parth R. Chauhan (Science and Society Studies)

Dr. Debdulal Saha (Development & Public Policy Studies)

Dr. Sunny Kumar (Indian History)

Prof. Amit Kulshrestha (Mathematics Education and for Science Education)

Dr. Satyajit Jena (Data Science)

## Earth and Environmental Sciences minor baskets

Earth and Environmental Sciences (20 credits)	EES304: Sedimentology and concepts in stratigraphy EES408: Igneous and metamorphic petrology EES403: Advanced remote sensing and GIS EES405: Climate data analysis and visualization EES407: Environment impact and risk assessment EES 645: Natural hazards and data driven hazard modeling
Earth Sciences	EES303: Mineralogy EES304: Sedimentology and concepts in stratigraphy EES403: Advanced remote sensing and GIS EES408: Igneous and metamorphic petrology EES410: Economic geology EES413: Geomorphology and earth surface processes EES631: Advanced geochemistry EES636: The quaternary period-environments, animals adaptations during the last 2.5 million years EES638: Paleoclimatology EES640: Global tectonics EES641: Radiogenic isotope geology EES644: Principles of microwave remote sensing EES 645: Natural hazards and data driven hazard modeling
Atmospheric Sciences	EES403: Advanced remote sensing and GIS EES404: Basic meteorology EES405: Climate data analysis and visualization IDC405: Atmospheric dynamics EES409: Tropical weather and climate EES416: Physics of monsoon IDC632: Introduction to atmospheric chemistry and physics IDC635: Aerosol measurements: principles and applications EES638: Paleoclimatology HSS636: Climate change and sustainable development
Environmental Sciences	EES403: Advanced remote sensing and GIS EES407: Environmental impact and risk assessment IDC408: Environmental hygiene, sanitation and waste management EES414: Public and environmental health science EES415: Geoscience and the sustainable development goals EES633: Principles of environmental chemistry EES642: Environmental microbiology EES643: Environmental biotechnology EES 645: Natural hazards and data driven hazard modelling EES646: Environmental aquatic chemistry HSS636: Climate change and sustainable development

## Chemistry minor

Any student, **who is a major in a subject other than Chemical Sciences**, can get a **"Minor in Chemistry"** if he/she takes **four courses** from at least two disciplines among the three broad disciplines (**Inorganic/Organic/ Physical Chemistry**) as per the following list of courses. Some of these courses have a prerequisite indicated within parenthesis. Students with non 'F' grade in the prerequisite courses can opt for the corresponding CHM6xx course.

### Physical Chemistry

Number	Title
CHM301	Quantum chemistry - I
CHM304	Quantum chemistry - II
IDC308	Symmetry in chemistry
CHM401	Molecular spectroscopy
CHM404	Statistical thermodynamics
CHM602	Magnetic resonance (Prerequisite(s): CHM301/PHY302, CHM401/PHY403)
CHM607	Chemical crystallography
CHM615	Kinetics and dynamics of chemical reactions (Prerequisite(s): CHM301/PHY302, CHM401/PHY403, CHM404/PHY304)
CHM616	Theoretical and computational chemistry
CHM619	Numerical methods in chemistry
CHM624	Soft matter, colloids, and interfacial phenomena
IDC638	Ultrafast spectroscopy in physics, chemistry and biology

### Organic Chemistry

Number	Title
CHM302	Organic chemistry
CHM305	Physical organic chemistry
CHM604	Advanced organic chemistry (Prerequisite(s): CHM302)
CHM606	Bio-organic chemistry (Prerequisite(s): CHM302 or IDC 202)
CHM609	Polymer chemistry
CHM610	Chemistry of natural products (Prerequisite(s): CHM302, CHM604)
CHM611	Frontiers of organometallic chemistry (Prerequisite(s): CHM306)
CHM612	Asymmetric synthesis and catalysis (Prerequisite(s): CHM302)
CHM613	Supramolecular chemistry
CHM626	Photochemistry-concepts, techniques and applications (Prerequisite(s): CHM305)
CHM633	Selected analytical techniques in organic chemistry

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## Inorganic Chemistry

Number	Title
CHM303	Main group chemistry
CHM306	Transition metal chemistry
CHM402	Chemistry of materials
CHM601	Advanced inorganic chemistry (Prerequisite(s): CHM303 and CHM306)
CHM608	Advanced industrial chemistry
CHM611	Frontiers of organometallic chemistry (Prerequisite(s): CHM306)
CHM618	Bioinorganic chemistry (Prerequisite(s): CHM306)
CHM622	Chemistry, energy and environment
CHM623	Concepts in nanomaterials and chemical applications
CHM629	Magnetochemistry
CHM630	Inorganic polymers, rings, macrocycles and cages
CHM631	Contemporary main group chemistry (Prerequisite(s): CHM303)
CHM632	Spectroscopic methods for inorganic chemistry (Prerequisite(s): CHM306 and CHM401)

## Chemistry specializations minor

List of specializations is as follows. These are open only to Chemistry majors. Any student can get a *Subject specialized minor* if he/she takes all the four courses from one specific discipline among the three broad disciplines (Inorganic/Organic/Physical Chemistry) as per the following list of courses. Some of these courses have a prerequisite indicated within parenthesis. Students with non 'F' grade in the prerequisite courses can opt for the corresponding CHM6xx course.

### Physical Chemistry

Number	Title
CHM602	Magnetic resonance (Prerequisite(s): CHM301/PHY302, CHM401/PHY403)
CHM607	Chemical crystallography
CHM615	Kinetics and dynamics of chemical reactions (Prerequisite(s): CHM301/PHY302, CHM401/PHY403, CHM404/PHY304)
CHM616	Theoretical and computational chemistry
CHM619	Numerical methods in chemistry
CHM624	Soft matter, colloids, and interfacial phenomena
IDC638	Ultrafast spectroscopy in physics, chemistry and biology

### Organic Chemistry

Number	Title
CHM604	Advanced organic chemistry (Prerequisite(s): CHM302)
CHM606	Bio-organic chemistry (Prerequisite(s): CHM302 or IDC202)
CHM609	Polymer chemistry
CHM610	Chemistry of natural products (Prerequisite(s): CHM302, CHM604)
CHM611	Frontiers of organometallic chemistry (Prerequisite(s): CHM306)
CHM612	Asymmetric synthesis and catalysis (Prerequisite(s): CHM302)
CHM613	Supramolecular chemistry
CHM626	Photochemistry-concepts, techniques and applications (Prerequisite(s): CHM305)
CHM633	Selected analytical techniques in organic chemistry

### Inorganic Chemistry

Number	Title
CHM601	Advanced inorganic chemistry (Prerequisite(s): CHM303 and CHM306)
CHM608	Advanced industrial chemistry

CHM611	Frontiers of organometallic chemistry (Prerequisite(s): CHM306)
CHM618	Bioinorganic chemistry (Prerequisite(s): CHM306)
CHM622	Chemistry, energy and environment
CHM623	Concepts in nanomaterials and chemical applications
CHM629	Magnetochemistry
CHM630	Inorganic polymers, rings, macrocycles and cages
CHM631	Contemporary main group chemistry (Prerequisite(s): CHM303)
CHM632	Spectroscopic methods for inorganic chemistry (Prerequisite(s): CHM306 and CHM401)

### **Astronomy minor**

IDC201: Astronomy and astrophysics

PHY635: Gravitation and cosmology

PHY637:\* Astrophysics I: astrophysical processes and stars

PHY638: Physics of fluids

PHY654:\* Astrophysics II: galaxies and cosmology

PHY663: Relativistic cosmology and the early universe

PHY669: Astronomical Techniques

PHY670: Astrostatistics

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\*These courses are mandatory for this minor

### **Biology Minor**

Any four of the biology major mandatory or elective courses may be chosen for this.

### **Mathematics minor**

Any four of the mathematics major mandatory or elective courses may be chosen for this, subject to Prerequisite(s). A consultation with the mathematics minors committee is recommended for choosing courses.

### **Physics minor**

Any four of the physics major mandatory or elective courses may be chosen for this, subject to Prerequisite(s).



## **Humanities and Social Sciences minor baskets**

### **Development and Public Policy Studies**

1. HSS650: Public policy (Mandatory course for this minor)
2. HSS617: From Plassey to partition: a history of modern India
3. HSS622: Cities: Urban theory and laboratory
4. HSS623: Bodily encounters: mobility, migrancy and movement
5. HSS626: Economic history of modern India
6. HSS630: Social theory and religion
7. HSS634: Themes in infrastructure studies
8. HSS646: Principles of economics
9. HSS647: Geographies of gender and sexuality
10. HSS648: Development economics: theory, policy and practice
11. HSS649: Themes in environmental histories of India
12. HSS652: Select themes in contemporary global political thought

### **Indian History**

1. HSS613: The social history of science in modern India, 1780-1950
2. HSS617: From Plassey to partition: a history of modern India
3. HSS618: India from prehistory to early history
4. HSS620: Imagining India: an intellectual history of orientalism
5. HSS626: Economic history of modern India
6. HSS627: Idea of India: intellectual imaginary of nation
7. HSS649: Themes in environmental histories of India
8. HSS651: Liberalism and the philosophical foundations of the British Empire

### **Science and Society Studies**

1. HSS304: Visual art: studio practice and theory
2. HSS602: Social theory: concepts and debates
3. HSS612: The idea of evolution: before and after Darwin
4. HSS613: The social history of science in modern India, 1780-1950
5. HSS614: Women's history of science
6. HSS615: Archaeology of the world: a cultural quest into our global past
7. HSS616: Bones, stones and chromosomes: the story of our evolution

8. HSS622: Cities: urban theory and laboratory
9. HSS625: The archaeology of ancient technologies
10. HSS628: Epistemology of science
11. HSS629: Metaphysics of science
12. HSS632: Philosophy of rationality
13. HSS636: Climate change and sustainable development
14. HSS638: Ethnographic research and writing
15. HSS642: Science and society
16. HSS648: Development economics: theory, policy and practice

### **Science education minor**

1. HSS642:\* Science and society
2. IDC411:\*\* School science curriculum and textbooks
3. IDC412:\* Field experience in science education
4. IDC636:\*\* Pedagogy of science
5. IDC637:\*\* Science communication
6. HSS636:\*\*\* Climate change and sustainable development
7. IDC408:\*\*\* Environmental hygiene, sanitation and waste management

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\*Mandatory for this minor.

\*\* At least one of these courses must be completed for this minor.

\*\*\* At most one of these courses may be done for this minor.

### **Mathematics education minor**

- IDC415: Mathematics and society
- IDC416: Mathematics curriculum
- IDC417: Teaching and learning of mathematics
- IDC418: Nature, history and foundations of mathematics
- IDC419: Mathematics communication
- IDC420: Field work in mathematics education



## Datascience minor

IDC409:*	Introduction to data science and artificial intelligence
IDC410:*	Machine learning
IDC207	Number theory and cryptography
IDC306	Biocomputing
IDC401	Theoretical biology
IDC402	Nonlinear dynamics, chaos and complex systems
EES405	Climate data analysis and visualization
MTH443	Algorithms and complexity
IDC407	Network science
BIO411	Advanced biology lab I
IDC414	Data analysis in R
PHY422	Computational methods in physics I
PHY425	Computational methods in physics II
BIO606	Biostatistics
CHM619	Numerical methods in chemistry
IDC621	Modelling complex systems
PHY622	Mathematical methods for physicists III
MTH442	Topology for data analysis

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\* Compulsory in this minor.