

# M.Sc. Life Sciences

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2022

Indian Institute of Science  
Division of Biological Sciences

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## A MODERN & **UNIQUE** PROGRAM

- Comprehensive foundational course work
- **Specialization** with a vast selection of electives
- Flexible and **dynamic course design**, can be individualized
- Dedicated emphasis on **core research** (28 credits ~ 1 year duration)
- Special lecture series and workshops for **broader skill development**



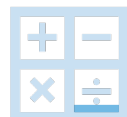
- **Specialization areas**
  - ❖ **Biochemistry and Biophysics**
  - ❖ **Cell and Developmental Biology**
  - ❖ **Ecology and Evolution**
  - ❖ **Microbiology and Infectious Diseases**
  - ❖ **Neuroscience and Behaviour**

# PROGRAM MODALITIES



Mode of entry

- Bachelor's degree or equivalent in Physical, Chemical or Biological Sciences\*
- Qualification in JAM/ GATE
- International students: GRE/GATE.



Intake

- 50 students per year



Course duration

- 64 credits
- Theory + Lab course (36 credits):
- Research project (28 credits):



Specialization selection

- At the time of admission
- Merit based ranking, written test, and interview

including Biotechnology, Pharmaceutical, Veterinary Sciences and Agricultural Sciences

JAM (Eligible streams – BT, CY, PH, MA)

GATE (Eligible streams – BM, BT, EC, EY, MA, PH, XL)

# COURSE CONTENT

| Code                 | Course name                               | Credits                  | Semester |
|----------------------|---|--------------------------|----------|
| <b>HARD CORE</b>     |   | <b>Total: 5 credits</b>  |          |
| MS101                | Critical thinking and Scientific Ethics   | 1                        | I        |
| MS201                | Mathematics and Statistics for biologists | 2                        | I        |
| MS202                | Soft skills lecture series and workshops  | 2                        | I, II    |
| <b>SOFT CORE</b>     |   | <b>Select: 8 credits</b> |          |
| MS203                | Biochemistry and Biophysics               | 3                        | I        |
| MS204                | Cell Biology                              | 2                        | I        |
| MS205                | Microbiology, Virology and Immunology     | 3                        | I        |
| MS206                | Molecular biology                         | 2                        | II       |
| MS207                | Ecology and Evolution                     | 3                        | II       |
| MS208                | Developmental Biology and Genetics        | 3                        | II       |
| MS209                | Physiology and Neurobiology               | 2                        | II       |
| <b>HARD CORE LAB</b> |   | <b>Total: 4 credits</b>  |          |
| MS210                | Molecular Techniques                      | 2                        | I        |
| MS211                | Genetics and Ecology                      | 2                        | II       |

**64 credits total**

**1) Core theory courses**

- 13 credits minimum
- Over two semesters in Year 1

**2) Core laboratory course**

- 4 credits
- Over two semesters in Year 1

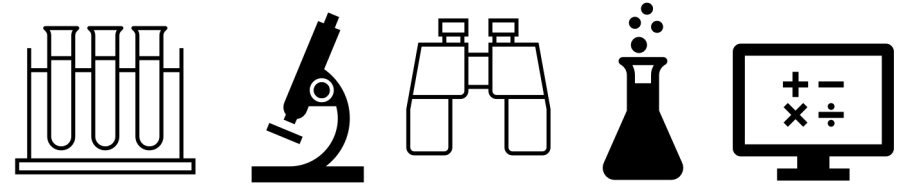
*Max - 18 credits/semesters*

**\* 9 new courses developed**

# COURSE CONTENT

## 3) Elective theory credits

- **19 credits**
- From existing courses in the IISc Scheme of Instruction within each area of specialization
- **Minimum 10 credits in the area of specialization.**
- Free to take electives from across specializations or courses **offered in other Divisions at IISc**
- Up to 6 credits can be deferred to year 2.



## 4) Research Project

- **28 credits**
- Can begin after semester 2
- Conducted in individual faculty labs
- In collaboration with faculty from other Divisions **(co-supervisor in DBS)**

# COURSES FOR ELECTIVES

## Neuroscience and Behaviour

| August Semester                                  | Credit | January Semester   | Credit |
|--|--------|--|--------|
| Systems Neuroscience (NS201)                     | 2      | Theoretical and Computational Neuroscience (MB208)             | 3:1    |
| Molecular and cellular basis of behaviour(NS202) | 2      | Developmental Genetics (MC202)                                 | 2      |
| Cognitive neuroscience (NS203)                   | 2      | Topics in Systems and Cognitive Neuroscience (NS301)           | 2      |
| Developmental neuroscience (NS204)               | 2      | Topics in Molecular, Cellular and Circuit Neuroscience (NS302) | 2      |
| Neuronal Physiology and Plasticity (MB214)       | 3      | Optical Spectroscopy and Microscopy (NS211)                    | 3      |
|  |        | Neural Signal Processing (NS212)                               | 2:1    |

## Microbiology and Infectious diseases

| August Semester  | Credit | January Semester                                   | Credit |
|--|--------|--|--------|
| Pathogen-host interactions and immune evasion mechanisms (MC205) | 2      | Basic and Applied Virology (MC214)                 | 2      |
| Essentials in Microbiology (MC203)                               | 3      | Molecular Oncology (MC210)                         | 2      |
| Essentials in Immunology (BC 206)                                | 3      | Current trends in Drug Discovery (BC302)           | 3      |
| Introduction to disease modelling (BE217)                        | 3      | Molecular basis of ageing and regeneration (RD209) | 2      |
| Molecular Systems Biology (CH248)                                | 3      | Genetics and Genomic Medicine (RD205)              | 2      |
| Drug Delivery: Principles and Applications (BE302)               | 3      |  |        |



# COURSES FOR ELECTIVES

## Cell and Developmental biology

| August Semester   | Credit | January Semester                                   | Credit |
|---|--------|--|--------|
| Genetics (RD201)  | 2      | Genetics and Genomic Medicine (RD205)              | 2      |
| Principles of Signal Transduction in Biological Systems (RD204) | 2      | Molecular Oncology (RD206)                         | 2      |
| Advances in Cell Biology (MC212)                                | 2      | Molecular basis of ageing and regeneration (RD209) | 2      |
| Principles in Genetic engineering (MC208)                       | 2      | Fundamentals of Physiology and Medicine (RD210)    | 2      |
|   |        | Developmental Genetics (MC202)                     | 2      |
|   |        |  |        |

## Ecology and Evolution

| August Semester  | Credit | January Semester                              | Credit |
|--|--------|---|--------|
| Animal Behaviour (EC 301)                                    | 3      | Theoretical and Mathematical Ecology (EC 201) | 3      |
| Plant Animal Interactions (EC302)                            | 3      | Evolutionary Biology (EC204)                  | 3      |
| Quantitative Ecology: Research Design and Inference (EC 305) | 3      | Ecosystems and Global Change (EC 309)         | 2      |
| Ecology: Pattern and Process (EC 202)                        | 3      |   |        |
|  |        |   |        |

# COURSES FOR ELECTIVES

## Biochemistry and Biophysics

| August Semester  | Credit | January Semester   | Credit |
|--|--------|--|--------|
| Introduction to Biophysical Chemistry (MB201)                  | 2      | Elements of Structural Biology (MB303)                         | 3      |
| Molecular Spectroscopy and its Biological Applications (MB204) | 3      | Electron Microscopy and 3D Image Processing (MB212)            | 2      |
| Introduction to X-ray Crystallography (MB205)                  | 2      | DNA-Protein Interaction, Regulation of gene expression (MB207) | 2      |
| Biomolecular NMR Spectroscopy (MB305)                          | 3      | Genetics and Genomic Medicine (RD205)                          | 2      |
| Proteins: Structure and Function (BC202)                       | 2      | Molecular Oncology (RD206)                                     | 2      |
| Bioinformatics (DS201)   | 2      |  |        |
|  |        |  |        |



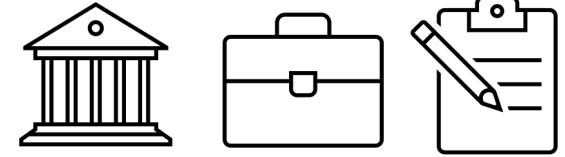
# COURSE CONTENT – SOFT SKILL DEVELOPMENT

5) Lecture series and workshops,  
with independent student presentations (2 credits)

- IP/ patent laws (IPTeL)
- Humanities, including science /environmental history
- Innovation and Entrepreneurship (SID, CCAMP)
- Artificial intelligence and data analytics (CDS)
- Governance: Wildlife protection and forest rights act
- Science Management
- Science Policy (CSP)
- Science communication, journalism (OoC)
- Sci-Art



# OUTCOME & EXPECTED EMPLOYABILITY



## IMMEDIATE OUTCOME

- **M.Sc. degree with a specialization (with thesis)**
- Students with this M.Sc. degree (CGPA > 8.5) and qualification from any National Exam (no cutoff to be applied) will be eligible to directly appear for the interviews to IISc Ph.D. program.

## EMPLOYABILITY

- Research & Academia
- Biotechnology & Pharmaceutical Industries
- Life Sciences Start-up Sector
- Health Sector
- Governance
- Environmental & Biodiversity Conservation
- Science communication

**JOIN US!**

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