I.3.2.A Curriculum Framework For Integrated M.Sc. in Artificial Intelligence, Data Science and Intelligent Systems

1. Program Title

Integrated M.Sc. in Artificial Intelligence, Data Science and Intelligent Systems

2. Program Philosophy

The **Integrated M.Sc. in Artificial Intelligence, Data Science and Intelligent Systems** is designed as a five-year future-technology academic pathway that develops learners into scientific thinkers, AI-era professionals, data-driven problem solvers, intelligent system builders, ethical technology practitioners, research-oriented learners, interdisciplinary collaborators and future-ready innovators.

The program is not intended to be a narrow AI, programming or tool-based degree. It is designed as a progressive capability-building pathway where students learn to think scientifically, reason with data, build intelligent computational systems, understand real-world domains, work with interdisciplinary problems, conduct research, design deployable AI solutions and act responsibly in human, institutional, industrial, healthcare and societal contexts.

The program is designed around the JSS GIFT academic philosophy of enabling learners to:

Learn	Build conceptual foundations in science, technology, computing, data and society.
Build	Develop real systems, models, dashboards, prototypes and digital products.
Experience	Engage with industry, healthcare, society, field contexts and institutional systems
Discover	Participate in research, data analysis, problem discovery and evidence generation.
Create	Develop innovations, products, patents, publications and deployment-ready solutions.
Lead	Develop communication, ethics, teamwork, leadership and future technology perspective.

Finally, the graduate should not merely know AI. The graduate should be able to think with science, reason with data, build with technology, research with discipline, act with ethics, create with purpose and lead in the AI era.

3. Program Duration and Award Structure

3.1 Normal Duration

The program shall be a **five-year Integrated M.Sc. program** conducted across:

Pre-Semester + Semester I to Semester X

The Integrated M.Sc. requires successful completion of:

196 Qualifying Credits + 10 Binary Graded Credits

The 10 Binary Graded Credits are mandatory for award completion but shall not be counted as part of the 196 Qualifying Credits.

3.2 Maximum Duration

The maximum duration to complete the Integrated M.Sc. shall be **10 years**, as per JSS GIFT regulations.

Students unable to complete within the prescribed maximum duration may be considered for honourable exit as applicable. A student may also voluntarily opt for an honourable exit at eligible stages.

4. Credit Architecture

The curriculum shall have three clearly separate credit categories:

1. **Qualifying Credits**
2. **Binary Graded Credits**
3. **Add-on Credits**

4.1 Category I: Qualifying Credits

Qualifying Credits are the main academic credits counted toward the award of Certificate, Diploma, B.Sc., B.Sc. Honors and Integrated M.Sc.

Stage	Cumulative Qualifying Credits	Possible Award / Exit
End of Year 1	40	Certificate
End of Year 2	80	Diploma
End of Year 3	120	B.Sc.
End of Year 4	160	B.Sc. Honors

Stage	Cumulative Qualifying Credits	Possible Award / Exit
End of Year 5	196	Integrated M.Sc.

4.2 Category II: Binary Graded Credits

Binary Graded Credits are institutional, human-development, civic, ethical, cultural, wellness and social responsibility credits.

They are:

- Non-qualifying
- Non-CGPA
- Completion-based
- Formative-assessment-based
- Graded only as **Successfully Completed / To be Repeated**
- Different from Add-on Credits

Each Binary Graded Course shall be a **1-credit course** of one of the following patterns:

Pattern	Meaning
0:1:0	Transaction / tutorial-based binary course
0:0:1	Practice / activity-based binary course

The learner shall complete **10 Binary Graded Credits**, preferably latest by the end of **Semester III**, so that Add-on Credits can begin from Semester IV onwards without overloading the credit architecture.

Some Binary Graded Courses may be compulsory, and some may be choice-based.

4.3 Category III: Add-on Credits

Add-on Credits are optional enrichment credits.

They are different from:

- Qualifying Credits
- Binary Graded Credits

Add-on Credits may lead to:

- Add-on Certification
- Add-on Diploma
- Add-on Minor Diploma
- Add-on Major Diploma

- Add-on Research Major
- Add-on Graduate Diploma

The Add-on component shall be reflected separately from the degree component. SGPA and CGPA for the degree component and Add-on component shall be computed separately as per regulations.

5. Award and Credit Combinations

Award Pathway	**Required Credit Structure**
Certificate Exit	40 Qualifying Credits
Diploma Exit	80 Qualifying Credits
B.Sc.	120 Qualifying Credits + 10 Binary Credits
B.Sc. with Add-on Certification	120 + 10 + 12 Add-on Credits
B.Sc. Honors	160 Qualifying Credits + 10 Binary Credits
B.Sc. Honors with Add-on Diploma / Minor / Major / Research Major / Certification	160 + 10 + 20 Add-on Credits
Integrated M.Sc.	196 Qualifying Credits + 10 Binary Credits
Integrated M.Sc. with Add-on Graduate Diploma	196 + 10 + 28 Add-on Credits
Post-B.Sc. M.Sc.	76 Qualifying Credits
Post-B.Sc. M.Sc. with Add-on Graduate Diploma	76 + 16 Add-on Credits
Integrated M.Sc. Honors	228 Qualifying Credits + 10 Binary Credits
Integrated M.Sc. Honors with Add-on Graduate Diploma	228 + 10 + 28 Add-on Credits
M.Sc. Honors after suitable 4-year degree	68 Credits
M.Sc. Honors after suitable 4-year degree with Add-on Graduate Diploma	68 + 16 Add-on Credits

5.1 Add-on Graduate Diploma Logic for Integrated M.Sc.

For the Integrated M.Sc. with Add-on Graduate Diploma:

20 Add-on Credits shall be completed from Semester IV to Semester VIII. **8 additional Add-on Credits** shall be completed in Year V, across Semester IX and Semester X.

Thus, the Integrated M.Sc. with Add-on Graduate Diploma shall require:

196 Qualifying Credits + 10 Binary Credits + 28 Add-on Credits

6. Semester-wise Qualifying Credit Distribution

Pre-Semester is an integral part of the first-semester academic structure.

Semester / Stage	Qualifying Credits
Pre-Semester	8
Semester I	12
Semester II	20
Semester III	20
Semester IV	20
Semester V	20
Semester VI	20
Semester VII	20
Semester VIII	20
Semester IX	20
Semester X	16
Total	**196**

7. Overall Semester-wise Credit Distribution Including Binary and Add-on Credits

Stage	Qualifying Credits	Binary Credits	Add-on Credits	Maximum Credits
Pre-Semester	**8**	0	0	8
Semester I	**12**	4	0	16
Semester II	**20**	4	0	24
Semester III	**20**	4	0	24
Semester IV	**20**	0	4	24
Semester V	**20**	0	4	24
Semester VI	**20**	0	4	24
Semester VII	**20**	0	4	24
Semester VIII	**20**	0	4	24
Semester IX	**20**	0	4	24
Semester X	**16**	0	4	20
Total	**196**	**10**	**28**	**236**

7.1 Credit Load Rule

A student may register for a maximum of **24 credits per regular semester**, inclusive of:

- Qualifying Credits
- Repeat Credits
- Add-on Credits
- Applicable Binary Credits

7.2 Summer Semester Rule

A student may register for a maximum of **16 credits during summer semester**, subject to academic and administrative approval.

Summer semester may be used for:

- Repeat courses
- Visiting expert courses
- Open electives
- Department electives
- Add-on courses
- Summer internships, where approved

8. L-T-P-SL Course Design Framework

Each course shall follow the JSS GIFT academic activity structure:

Component	Meaning
L	Lecture
T	Transaction / Tutorial
P	Practice / Practical
SL	Self-Learning

A course should not be purely lecture-based. Every course shall contain **T and/or P components**.

A typical 4-credit course may follow:

2:1:1

This corresponds to:

- 2 lecture hours per week
- 2 transaction/tutorial hours per week

- 2 practice hours per week
- 2 hours of guided self-learning per week

Since **T** is available as a transaction/tutorial engagement of 2 hours per session, 2-credit courses, especially in the Pre-Semester, may be designed with stronger T/P orientation instead of lecture-heavy design.

9. Pre-Semester Structure

Bridge to Future Technology Education

Qualifying Credits: 8

The Pre-Semester is treated as part of the first-semester academic structure. It is designed as a bridge from +2 / PUC / higher secondary education into rigorous future-technology education.

The Pre-Semester shall follow:

100% Formative Assessment
No Summative Assessment

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-PS1101	Mathematical Readiness for AI and Data	0:2:0	2	+2 / PUC level mathematics exposure; diagnostic support to be provided
GFT-PS1102	Computational Thinking and Problem Solving	0:1:1	2	No prior programming required
GFT-PS1103	Digital Learning, AI Tools and Academic Readiness	0:1:1	2	Basic digital literacy preferred; orientation support to be provided
GFT-PS1104	Programming Readiness and Self-Practice Studio	0:0:2	2	No prior programming required; to be conducted from absolute beginner level
Total			**8**	

9.1 Note on GFT-PS1104

GFT-PS1104 Programming Readiness and Self-Practice Studio shall be conducted as a guided beginner-level programming readiness studio.

It shall include:

- Problem understanding before coding
- Algorithmic thinking through daily-life examples
- Flowcharts and pseudocode
- Block-based or visual logic exercises, wherever required
- Python environment orientation
- Input, output, variables and expressions
- Conditions and loops
- Simple functions
- Error identification and correction
- Auto-evaluated micro-practice tasks
- Mentor-supported weekly review
- Peer-supported practice groups

The course shall not assume prior programming exposure.

10. Semester-wise Curriculum Structure

Semester I

Foundations of Science, Computing and AI

Qualifying Credits: 12

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI1101	Scientific Thinking and Systems Orientation	2:1:1	4	Completion / concurrent completion of Pre-Semester academic orientation
GFT-AI1102	Python Programming for Problem Solving	1:1:2	4	GFT-PS1102 and GFT-PS1104, or equivalent programming readiness
GFT-AI1103	Foundations of Data Literacy and Digital Systems	2:1:1	4	GFT-PS1103, or equivalent digital academic readiness
Total			**12**	

Semester I Outcome

Students should be able to reason scientifically, understand systems, represent data digitally, write simple programs, use Python for structured problem solving and begin technology-integrated academic practice.

Note on GFT-AI1101 and GFT-AI1102

These courses shall be delivered as applied foundation courses for AI and Data Science. They shall not assume advanced engineering mathematics. Students from state-board,

biology, commerce-mathematics or non-computer-science backgrounds shall be supported through diagnostic assessment, bridge worksheets, guided tutorials, mathematics clinics and computational demonstrations.

Semester II

Mathematics, Programming and Data Foundations

Qualifying Credits: 20

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI1201	Linear Algebra and Matrix Methods for AI	2:1:1	4	GFT-PS1101; Mathematics Clinic support for students requiring bridge help
GFT-AI1202	Probability and Statistics for Data Science	2:1:1	4	GFT-PS1101; Mathematics Clinic support for students requiring bridge help
GFT-AI1203	Programming Structures and Algorithmic Thinking	1:1:2	4	GFT-AI1102
GFT-AI1204	Data Handling, Visualization and Exploratory Analysis	1:1:2	4	GFT-AI1103 and basic Python readiness
GFT-AI1205	Mini Project I: Data and Problem Discovery	0:1:3	4	Concurrent completion of GFT-AI1201, GFT-AI1202, GFT-AI1203 and GFT-AI1204
Total			**20**	

Semester III

Core Computing and Data Systems
Qualifying Credits: 20

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI2101	Discrete Mathematics and Logic for Intelligent Systems	2:1:1	4	GFT-AI1201 and GFT-AI1203
GFT-AI2102	Data Structures and Algorithms	1:1:2	4	GFT-AI1203
GFT-AI2103	Database Systems and Data Modelling	1:1:2	4	GFT-AI1204
GFT-AI2104	Object-Oriented Design and Software Construction	1:1:2	4	GFT-AI1102 and GFT-AI1203

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI2105	Technology-Integrated Practice Lab I	0:1:3	4	Concurrent completion of GFT-AI2102, GFT-AI2103 and GFT-AI2104
Total			**20**	

Semester IV

AI Foundations and Applied Data Analytics

Qualifying Credits: 20

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI2201	Foundations of Artificial Intelligence	2:1:1	4	GFT-AI2101 and GFT-AI2102
GFT-AI2202	Statistical Modelling and Inferential Analytics	2:1:1	4	GFT-AI1202
GFT-AI2203	Data Engineering Foundations	1:1:2	4	GFT-AI2103 and GFT-AI1204
GFT-AI2204	Web, APIs and Intelligent Application Development	1:1:2	4	GFT-AI2104
GFT-AI2205	Mini Project II: Data Product Prototype	0:1:3	4	Concurrent completion of GFT-AI2201 to GFT-AI2204
Total			**20**	

Semester V

Machine Learning and Intelligent Applications

Qualifying Credits: 20

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI3101	Machine Learning Foundations	2:1:1	4	GFT-AI1201, GFT-AI1202 and GFT-AI1204
GFT-AI3102	Optimization Methods for AI and Data Science	2:1:1	4	GFT-AI1201 and GFT-AI1202
GFT-AI3103	Operating Systems, Cloud and Computing Infrastructure	2:1:1	4	GFT-AI2102 and GFT-AI2104

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI3104	Human-Centred Design for Intelligent Applications	1:1:2	4	GFT-AI1101 and GFT-AI2204
GFT-AI3105	Applied ML Lab I	0:1:3	4	Concurrent completion of GFT-AI3101
Total			**20**	

Semester VI

Deep Learning, Intelligent Systems and Research Foundations

Qualifying Credits: 20

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI3201	Deep Learning and Neural Networks	2:1:1	4	GFT-AI3101 and GFT-AI3102
GFT-AI3202	Intelligent Systems: Sensing, Reasoning and Adaptation	2:1:1	4	GFT-AI2201 and GFT-AI3101
GFT-AI3203	Research Methodology and Scientific Writing	2:1:1	4	Completion of Year 2 courses or equivalent academic readiness
GFT-AI3204	Responsible AI, Data Ethics and Society	2:1:1	4	GFT-AI1101 and GFT-AI2201
GFT-AI3205	Mini Project III: Intelligent System Prototype	0:1:3	4	Concurrent completion of GFT-AI3201, GFT-AI3202 and GFT-AI3204
Total			**20**	

Year 3 Exit

On successful completion of **120 Qualifying Credits + 10 Binary Graded Credits**, the student may exit with:

B.Sc. in Artificial Intelligence, Data Science and Intelligent Systems

A student completing an additional **12 Add-on Credits**, where applicable, may be eligible for:

B.Sc. with Add-on Certification

Semester VII

Advanced AI, Systems and Domain Intelligence

Qualifying Credits: 20

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI4101	Advanced Machine Learning and Model Engineering	2:1:1	4	GFT-AI3101 and GFT-AI3105
GFT-AI4102	Natural Language Processing and Text Intelligence	2:1:1	4	GFT-AI3101 and Python programming capability
GFT-AI4103	Computer Vision and Visual Intelligence	2:1:1	4	GFT-AI3201 and Python programming capability
GFT-AI4104	Domain Intelligence Elective I	2:1:1	4	Completion of Year 3 courses or approval of Program Committee
GFT-AI4105	Industry / Domain Immersion Project I	0:1:3	4	GFT-AI3203 and approval of project mentor
Total			**20**	

Domain Intelligence Elective I Options

Students may choose from:

- AI for Healthcare and Life Sciences
- AI for Business and Financial Systems
- AI for Education and Learning Systems
- AI for Public Systems and Governance
- AI for Industrial and Manufacturing Systems
- AI for Environment and Sustainability
- Intelligence Theoretical Computing

Semester VIII

Generative AI, Decision Intelligence and Product Systems

Qualifying Credits: 20

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI4201	Generative AI, Large Language Models and RAG Systems	2:1:1	4	GFT-AI4102 and GFT-AI3201
GFT-AI4202	Decision Intelligence and Causal Reasoning	2:1:1	4	GFT-AI2202 and GFT-AI3101
GFT-AI4203	MLOps, AI Deployment and Model Governance	1:1:2	4	GFT-AI3103 and GFT-AI3101
GFT-AI4204	AI Product Engineering and Innovation Studio	1:1:2	4	GFT-AI3104 and GFT-AI2204
GFT-AI4205	Major Project I: AI Product / Research Prototype	0:1:3	4	GFT-AI3203 and completion of at least two advanced AI courses
Total			**20**	

Year 4 Exit

On successful completion of **160 Qualifying Credits + 10 Binary Graded Credits**, the student may exit with:

B.Sc. Honors in Artificial Intelligence, Data Science and Intelligent Systems

A student completing an additional **20 Add-on Credits** may be eligible for one of the following:

- Add-on Diploma
- Add-on Minor Diploma

- Add-on Major Diploma
- Add-on Research Major
- Add-on Certification, where credits are less than the prescribed diploma threshold

Semester IX

Specialization, Research and Advanced Intelligent Systems

Qualifying Credits: 20

Course Code	Course Title	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-AI5101	Specialization Elective I	2:1:1	4	Completion of relevant specialization foundation
GFT-AI5102	Specialization Elective II	2:1:1	4	Completion of relevant specialization foundation
GFT-AI5103	Advanced Research Methods for AI and Data Science	2:1:1	4	GFT-AI3203
GFT-AI5104	AI Systems Architecture and Scalable Intelligent Platforms	1:1:2	4	GFT-AI4203 and GFT-AI3103
GFT-AI5105	Capstone Phase I: Research / Industry / Product Definition	0:1:3	4	GFT-AI4205 and approved capstone proposal area
Total			**20**	

Specialization Basket

Students may choose one specialization pathway.

Track A: AI Engineering

- Advanced Model Engineering
- Scalable AI Systems
- AI Infrastructure and Pipelines
- Applied AI Architecture

Track B: Data Science and Decision Intelligence

- Advanced Analytics
- Causal AI
- Business Intelligence and Decision Systems
- Data Storytelling and Evidence Design

Track C: Generative AI and AI Agents

- LLM Engineering
- Retrieval-Augmented Generation
- AI Agents and Workflow Automation
- Evaluation and Safety of Generative AI

Track D: Intelligent Applications and Human-AI Systems

- Human-AI Interaction
- Conversational Systems
- Personalization and Recommender Systems
- AI for Assistive and Inclusive Technologies

Track E: Autonomous and Cyber-Physical Intelligence

- Robotics Intelligence
- Sensor Data Intelligence
- Edge AI
- Intelligent Control Systems

Track F: AI for Healthcare, Life Sciences and Society

- Health Data Science
- Biomedical AI Foundations
- Public Systems Intelligence
- AI for Social Good

Track G: Intelligence Theoretical Computing

Students may choose courses from the following basket

- Graph Theoretical Thinking for Intelligent Design
- Algorithmic Thinking for Learning and Intelligence
- Data Structure Models for Intelligent Systems

- Computational Infrastructure for Scalable Intelligence
- Representation Thinking for AI Models
- Complexity Thinking for Intelligent Problem Solving
- Computational Models of Reasoning and Decision Intelligence
- Network Science and Emergent Intelligence
- Formal Models for Safe and Explainable AI
- Computational Design of AI Agents and Intelligent Workflows

Semester X

Capstone, Professional Readiness and Future Leadership

Qualifying Credits: 16

Course Code	**Course Title**	**L:T:P**	**Credits**	**Prerequisite / Readiness Requirement**
GFT-AI5201	Specialization Elective III	2:1:1	4	Completion of Specialization Elective I / II or equivalent
GFT-AI5202	AI Governance, Policy, Safety and Future Technology Leadership	2:1:1	4	GFT-AI3204 and GFT-AI4203
GFT-AI5203	Capstone Phase II: Implementation, Evaluation and Dissertation	0:2:6	8	GFT-AI5105 and approved capstone proposal
Total			**16**	

Year 5 Exit

On successful completion of **196 Qualifying Credits + 10 Binary Graded Credits**, the student becomes eligible for:

Integrated M.Sc. in Artificial Intelligence, Data Science and Intelligent Systems

A student who has already completed **20 Add-on Credits from Semesters IV to VIII** and completes an additional **8 Add-on Credits in Year V** shall be eligible for:

Integrated **M.Sc. with Add-on Graduate Diploma**

Thus:

20 **+ 8 = 28 Add-on Credits**

11. Binary Graded Course Architecture

10 Credits to be Completed Latest by Semester III

Binary Graded Courses shall be completed latest by the end of **Semester III**, because Add-on Courses shall begin from **Semester IV onwards** at the rate of **4 credits per semester**.

The Binary Graded Course basket shall include both compulsory and choice-based courses.

11.1 Suggested Binary Credit Distribution

Semester	**Binary Credit Requirement**
Semester I	4 credits
Semester II	4 credits
Semester III	2 credits
Total by Semester III	**10 credits**

11.2 Compulsory Binary Graded Courses

Suggested Semester	**Course Code**	**Course Title**	**L:T:P**	**Credits**	**Prerequisite / Readiness Requirement**
Semester I	GFT-BG01	Orientation to JSS GIFT Academic Culture	0:1:0	1	Admission to program
Semester I	GFT-BG02	Communication and Learning Skills	0:1:0	1	Admission to program
Semester II	GFT-BG03	Universal Human Values	0:1:0	1	Admission to program
Semester II	GFT-BG04	Physical Fitness, Well-being and Personal Discipline	0:0:1	1	Medical/fitness self-declaration, where required
Semester III	GFT-BG05	Constitution of India and Civic Responsibility	0:1:0	1	Admission to program
Semester III	GFT-BG06	Environmental Studies and Sustainability	0:1:0	1	Admission to program

Total compulsory Binary Credits: **6**

11.3 Choice-Based Binary Graded Basket

Students may choose **4 credits** from the following basket

Course Code	Choice-Based Binary Course	L:T:P	Credits	Prerequisite / Readiness Requirement
GFT-BGE01	Stories from Indian Independence	0:1:0	1	Admission to program
GFT-BGE02	Gerontology and Ageing Society	0:1:0	1	Admission to program
GFT-BGE03	Philosophical Thinking	0:1:0	1	Admission to program
GFT-BGE04	Indian Knowledge Systems and Cultural Heritage	0:1:0	1	Admission to program
GFT-BGE05	Gender Sensitization and Social Responsibility	0:1:0	1	Admission to program
GFT-BGE06	Self-Empowerment and Life Skills	0:1:0	1	Admission to program
GFT-BGE07	Personal Hygiene and Health Awareness	0:0:1	1	Admission to program
GFT-BGE08	Sports, Games and Physical Participation	0:0:1	1	Fitness suitability, where required
GFT-BGE09	NCC / NSS / Student Affairs / Social Activity	0:0:1	1	Institutional activity enrolment
GFT-BGE10	Fix It Yourself: Practical Life Skills	0:0:1	1	Admission to program
GFT-BGE11	Sustainability Practice	0:0:1	1	Admission to program
GFT-BGE12	Mindfulness and Reflective Living	0:0:1	1	Admission to program

11.4 Binary Completion Rule

A student shall complete:

6 Compulsory Binary Credits + 4 Choice-Based Binary Credits = 10 Binary Credits

latest by the end of **Semester III**.

All Binary Graded Courses shall be assessed as:

Successfully Completed / To be Repeated

No summative assessment shall be conducted for Binary Graded Courses.

12. Add-on Elective Course Architecture

Add-on Courses shall begin from **Semester IV onwards**.

They shall be offered at the rate of:

4 Add-on Credits per semester

from Semester IV to Semester VIII.

This gives:

Semester	**Add-on Credits**
Semester IV	4
Semester V	4
Semester VI	4
Semester VII	4
Semester VIII	4
Total by End of Semester VIII	**20**

These 20 Add-on Credits may lead to:

- Add-on Minor Diploma
- Add-on Major Diploma
- Add-on Research Major
- Add-on Diploma

- Add-on Certification, where credit completion is less than diploma threshold

12.1 Add-on Graduate Diploma Extension in Year V

For Integrated M.Sc. students seeking Add-on Graduate Diploma:

Stage	Add-on Credits
Semesters IV–VIII	20
Year V / Semesters IX–X	8
Total	**28**

Thus, the Integrated M.Sc. with Add-on Graduate Diploma shall require:

196 Qualifying Credits + 10 Binary Credits + 28 Add-on Credits

12.2 Add-on Minor Track

A student earning **20 Add-on Credits** from an allied discipline may be awarded:

Add-on Minor Diploma

Indicative Minor Areas

- Healthcare and Life Sciences
- Pharmacy and Drug Discovery
- Business and Financial Systems
- Education and Learning Systems
- Public Health and Governance
- Environmental Sustainability
- Cognitive and Behavioural Systems
- Design and Human-Centred Innovation

Add-on Minor Track Structure

Semester	Course Type	Credits	Prerequisite / Readiness Requirement
Semester IV	Minor Course I	4	Completion of Year 1 courses or approval of Program Committee
Semester V	Minor Course II	4	Minor Course I or approval
Semester VI	Minor Course III	4	Minor Course II or approval
Semester VII	Minor Course IV	4	Minor Course III or approval
Semester VIII	Minor Capstone / Minor Project or	4	Completion of at least three Minor courses or approval

Semester	Course Type	Credits	Prerequisite / Readiness Requirement
	Alternate Minor Course		
Total		**20**	

12.3 Add-on Major Track

A student earning **20 Add-on Credits vertically in the parent discipline** may be awarded:

Add-on Major Diploma

Parent Discipline

Artificial Intelligence, Data Science and Intelligent Systems

Indicative Major Areas

- AI Engineering
- Data Science and Decision Intelligence
- Generative AI and AI Agents
- Autonomous and Cyber-Physical Intelligence
- AI Product Engineering
- Intelligent Systems Architecture
- Intelligence Theoretical Computing

Add-on Major Track Structure

Semester	Course Type	Credits	Prerequisite / Readiness Requirement
Semester IV	Major Course I	4	Completion of Year 1 courses or approval
Semester V	Major Course II	4	Major Course I or approval
Semester VI	Major Course III	4	Major Course II or approval
Semester VII	Major Course IV	4	Major Course III or approval
Semester VIII	Major Capstone / Major Project or Alternate Major Course	4	Completion of at least three Major courses or approval
Total		**20**	

12.4 Add-on Research Major Track

A student earning **20 Add-on Credits in a coherent research-intensive pathway** may be awarded:

Add-on Research Major

Add-on Research Major Track Structure

Semester	**Course Type**	**Credits**	**Prerequisite / Readiness Requirement**
Semester IV	Research Foundations Studio	4	Completion of Year 1 courses or approval
Semester V	Literature Review and Research Reading Studio	4	Research Foundations Studio or approval
Semester VI	Research Data and Experimental Design	4	Literature Review and Research Reading Studio or approval
Semester VII	Research Writing, Publication and Patent Methods	4	Research Data and Experimental Design or approval
Semester VIII	Research Major Capstone / Research Project or Alternate Research Course	4	Completion of at least three Research Major courses or approval
Total		**20**	

12.5 Add-on Project / Capstone Course Pattern

For Add-on Diploma / Minor / Major / Research Major, one of the 4-credit courses may be a capstone/project course.

The preferred project course pattern shall be:

Course Type	L:T:P	Credits
Add-on Capstone / Add-on Project	0:1:3	4

In lieu of the capstone/project course, a student may be permitted to take an approved alternate 4-credit course from the same Add-on track, subject to approval by the HoD / Program Committee / Credit Equivalence and Credit Transfer Committee, as applicable.

13. Assessment Architecture

The program shall follow the JSS GIFT capability-oriented assessment model.

13.1 Assessment Weightage

Component	Weightage
Formative Assessment	70%
Summative Assessment	30%
Total	**100%**

13.2 Formative Assessment Structure for Regular Courses

Formative Assessment shall be conducted continuously, unit-wise.

Each course shall generally have **4 units**.

Group Formative Assessment

Component	Marks
GFA-1: Unit 1	25
GFA-2: Unit 2	25
GFA-3: Unit 3	25
GFA-4: Unit 4	25
Total GFA	**100**

Each GFA may include:

- Group assignment
- Group report
- PPT material
- Student presentation
- Discussion / viva voce
- Problem-solving evidence
- Design-thinking output

13.3 Individual Formative Assessment

Two **Individual Formative Assessments (IFA)** shall be conducted during the semester.

The term **IFA** stands for **Individual Formative Assessment**.

Each IFA shall contain two questions.

Each IFA shall be evaluated for 40 marks and reduced to 20 marks.

Component	Raw Marks	Reduced Marks
IFA-1	40	20
IFA-2	40	20
Total IFA	**80**	**40**

Thus:

Total FA = GFA 100 + IFA 40 = 140 marks

The FA score out of 140 shall be mapped to 70 marks.

13.4 Summative Assessment Structure

Summative Assessment shall be conducted after completion of 16 weeks of teaching-learning activity.

SA shall be for:

60 marks mapped to 30

The SA shall have:

- 3 holistic inter-unit questions
- 20 marks per question
- No routine unit-wise fragmentation
- Higher-order Bloom's Taxonomy orientation
- Design, analysis, evaluation and application focus

Where relevant, one 20-mark component may be replaced by a semester-end practical assessment.

13.5 Assessment for Exclusive T/P Courses

For courses such as:

- Projects
- Capstones

- Internships
- Industry engagement
- Research engagement
- Practice studios

The assessment shall follow:

Component	**Timing**	**Marks**
FA-1	4th week	30
FA-2	8th week	30
FA-3	12th week	40
FA-4	16th week	40
Total FA		**140**
SA	End semester	**60**

The FA score shall be mapped to 70 and SA score shall be mapped to 30.

External examiner's involvement may be considered for major project, internship, dissertation and capstone courses.

14. Qualifying Criteria

A student shall successfully complete a course only if the following are satisfied:

- Attendance requirement met
- Mapped FA score is at least 50%
- Mapped SA score is at least 40%
- Total score qualifies for grade award

Transitional Grades

Condition	**Grade**
Attendance requirement not met	R — Repeat
FA less than 50%	R — Repeat
SA less than 40%	I — Incomplete

A student with R grade shall repeat the course.

A student with I grade shall appear for the Summative Assessment when offered.

15. Attendance Rules

JSS GIFT expects **100% attendance**.

However, attendance shall not be less than:

75% of aggregate L, T and P sessions

Condonation may be provided up to 10% for valid reasons such as:

- Ill-health
- Social obligations
- Sports/cultural participation
- Placement activities
- Approved institutional activities

Students not meeting attendance requirements shall be placed under **R grade** and shall not be permitted to take the Summative Assessment.

16. Programming Readiness Support

Students without prior programming exposure shall be supported through:

- Absolute beginner programming orientation
- Flowcharts and pseudocode
- Visual logic activities
- Python setup support
- Guided micro-practice
- Auto-evaluated beginner exercises
- Peer learning groups
- Mentor review
- Weekly remediation

This support shall be especially integrated into:

- GFT-PS1102 Computational Thinking and Problem Solving
- GFT-PS1104 Programming Readiness and Self-Practice Studio
- GFT-AI1102 Python Programming for Problem Solving

17. Mathematics Readiness Support

Students from varied state-board, biology, non-computer-science or non-advanced mathematics backgrounds shall be supported through:

- Mathematical readiness diagnostic test

- Bridge worksheets
- Mathematics Clinic
- Visual explanation of algebra, vectors and probability
- Python-based mathematical demonstrations
- Applied examples from data and AI
- Tutorial-led remedial sessions
- Practice-based formative feedback

This support is especially important for:

- GFT-AI1201 Linear Algebra and Matrix Methods for AI
- GFT-AI1202 Probability and Statistics for Data Science

Both courses are essential and shall be retained, but their delivery shall be foundation-oriented, applied, scaffolded and practice-heavy.

18. Progressive Project Architecture

Year	Project Level	Nature
Year 1	Mini Project I	Data and problem discovery
Year 2	Mini Project II	Data product prototype
Year 3	Mini Project III	Intelligent system prototype
Year 4	Major Project I	AI product or research prototype
Year 5	Capstone	Research, industry, product, domain or intelligent system deployment

19. Internship and Immersion Model

Stage	Engagement Type	Expected Outcome
Early Years	Observation and exposure	Understand domains, institutions, workflows and data contexts
Middle Years	Skill-based mini-internship	Apply programming, data and AI skills
Advanced Years	Domain immersion	Work with industry, research, healthcare, public systems or technology teams
Final Year	Research / industry / product capstone	Produce dissertation, prototype, product, publication or deployment-ready solution

20. Multi-Entry and Lateral Entry Structure

20.1 Normal Entry

A student with +2 / PUC / higher secondary qualification enters Year 1 of the Integrated M.Sc. pathway.

20.2 Diploma Holder after Class 10

A candidate with a Diploma qualification based on SSLC / Class 10 may enter Year 2, subject to credit equivalence and bridge requirements.

20.3 Diploma Holder after +2

A candidate with an appropriate Diploma qualification for which +2 is the prerequisite may enter Year 3, subject to credit equivalence and bridge requirements.

20.4 B.Sc. Lateral Entry

A candidate with an appropriate B.Sc. degree may enter Year 4 for the post-B.Sc. M.Sc. pathway.

Such a candidate shall earn:

76 credits

to qualify for the M.Sc. degree.

20.5 Four-Year Degree Entry

A candidate with a suitable 4-year degree such as:

- B.Sc. Honors
- B.S.
- B.Tech.
- B.E.
- B.Sc. Nursing
- MBBS

may enter Year 5 with the intention of earning M.Sc. Honors, subject to equivalence and bridge requirements.

20.6 Credit Equivalence

All lateral entry, re-entry, credit transfer, MOOC credit, internship credit, creative work credit and equivalent learning shall be processed through the:

Credit Equivalence and Credit Transfer Committee

21. Technology-Integrated Academic Execution

The program shall be executed through a technology-integrated learning and assessment model.

This shall support:

- Course-wise digital learning plans
- Unit-wise L-T-P-SL mapping
- Assignment and practice tracking
- Auto-evaluated programming tasks
- Auto-evaluated data tasks
- Online self-learning courses
- Online self-practice courses
- Group workspaces
- Individual formative assessment workflows
- Portfolio creation
- Project milestone tracking
- Internship evidence submission
- Capstone documentation
- Skill analytics
- Capability analytics
- Credit tracking
- Exit-readiness mapping
- Faculty dashboards
- Learner progression reports
- Outcome attainment reports

The technology-integrated model shall ensure that every learner's progress is visible through evidence, not merely through marks.

22. Program Objectives

The program aims to:

1. Build strong foundations in mathematics, statistics, computing, programming, data, AI and intelligent systems.
2. Develop scientific thinking, computational thinking, systems thinking and evidence-based reasoning.

3. Enable students to design, develop, evaluate and deploy intelligent applications and data-driven systems.
4. Train students to work with structured, semi-structured and unstructured data across real-world contexts.
5. Prepare students to apply machine learning, deep learning, generative AI and decision intelligence responsibly.
6. Integrate domain knowledge from healthcare, life sciences, industry, society, business and public systems.
7. Develop research capability through literature review, experimentation, data analysis, scientific writing and capstone work.
8. Build ethical awareness in AI, data privacy, bias, fairness, explainability, human oversight and social impact.
9. Develop professional capability through projects, internships, portfolios, communication, teamwork and leadership.
10. Produce AI-era scientific professionals who can solve complex problems using data, intelligence, systems thinking and ethical technology.

23. Program Outcomes

At the end of the program, students shall be able to:

PO1: Scientific Reasoning

Apply scientific thinking, logical reasoning and evidence-based analysis to complex problems.

PO2: Mathematical and Statistical Foundations

Use mathematics, statistics, probability, linear algebra, optimization and numerical methods for AI and data science.

PO3: Computational and Programming Capability

Design algorithms, write programs, build computational solutions and implement software systems.

PO4: Data Science Capability

Acquire, clean, process, analyse, visualize and interpret data from diverse sources.

PO5: AI and Machine Learning Capability

Design, train, evaluate and improve machine learning and AI models for real-world problems.

PO6: Intelligent Systems Design

Build systems that can sense, learn, reason, adapt, decide, interact and support intelligent action.

PO7: Generative AI and AI Agents

Develop responsible generative AI applications, retrieval-augmented systems, AI agents and intelligent workflows.

PO8: Domain-Aware Application

Apply AI and data science to healthcare, life sciences, industry, society, education, business and public systems.

PO9: Research Capability

Conduct literature review, define research problems, design experiments, analyse results and communicate findings.

PO10: Ethical and Responsible Technology Practice

Address bias, fairness, privacy, explainability, accountability, safety, misuse and social consequences of AI.

PO11: Product and Innovation Capability

Transform ideas into prototypes, dashboards, platforms, products, startup concepts or deployable intelligent solutions.

PO12: Professional Readiness

Demonstrate teamwork, communication, leadership, portfolio readiness and adaptability for future technology careers.

24. Graduate Attributes

On completion of the program, the graduate shall demonstrate:

- Scientific thinking and evidence-based reasoning
- Computational thinking and algorithmic problem solving
- Mathematical and statistical reasoning
- Programming capability and software system design
- Data engineering, analytics and visualization capability
- Machine learning, deep learning and generative AI capability
- Intelligent systems design and automation capability
- Research orientation and scientific writing ability
- Ethical, responsible and human-centred AI practice
- Domain-aware problem solving

- Product thinking and innovation capability
- Interdisciplinary collaboration and professional communication
- Lifelong learning and adaptability

25. Exit Award Outcomes

Certificate Exit: 40 Qualifying Credits

The student should demonstrate:

- Basic mathematical readiness
- Basic programming capability
- Data literacy
- Scientific thinking
- Computational problem solving
- Digital learning discipline

Diploma Exit: 80 Qualifying Credits

The student should demonstrate:

- Programming and software foundations
- Database and data handling capability
- Basic AI awareness
- Applied data analytics
- Data product prototyping

B.Sc. Exit: 120 Qualifying Credits + 10 Binary Credits

The student should demonstrate:

- Machine learning foundations
- Intelligent application development
- Deep learning basics
- Responsible AI awareness
- Research writing foundations
- Working intelligent system prototype

B.Sc. Honors Exit: 160 Qualifying Credits + 10 Binary Credits

The student should demonstrate:

- Advanced AI application development
- NLP and computer vision capability
- Generative AI application awareness

- MLOps and deployment basics
- Domain intelligence exposure
- AI product or research prototype

Integrated M.Sc. Exit: 196 Qualifying Credits + 10 Binary Credits

The student should demonstrate:

- Advanced AI/data/intelligent systems capability
- Specialization depth
- Research and capstone maturity
- Ethical and governance awareness
- Portfolio readiness
- Industry/research/product capability
- Ability to solve complex real-world problems

26. M.Sc. Honors Extension

Students who proceed to the M.Sc. Honors extension shall complete an additional:

32 Qualifying Credits

Total: **228 Qualifying Credits + 10 Binary Graded Credits**

Semester	**Course Type**	**Credits**
Semester XI	Advanced Research Seminar	4
Semester XI	Advanced Specialization Elective IV	4
Semester XI	Advanced Specialization Elective V	4
Semester XI	Research Thesis Phase I	4
Semester XII	Advanced Specialization Elective VI	4
Semester XII	Research Publication / Patent / Product Studio	4
Semester XII	Research Thesis Phase II	8
Total Additional Credits		**32**

The M.Sc. Honors learner should be positioned as a research-intensive AI and intelligent systems professional capable of publication-oriented, patent-oriented, product-oriented or doctoral-level work.

27. Career Pathways

Graduates may move into roles such as:

1. AI Engineer

2. Data Scientist
3. Machine Learning Engineer
4. Data Engineer
5. Applied AI Developer
6. Intelligent Systems Developer
7. Generative AI Application Developer
8. AI Product Analyst
9. Decision Intelligence Analyst
10. Business Intelligence Analyst
11. Computer Vision Associate
12. NLP Engineer
13. AI Research Assistant
14. Human-AI Interaction Analyst
15. Automation Analyst
16. AI Solutions Consultant
17. MLOps Associate
18. Data Platform Associate
19. AI Product Builder
20. Research Fellow / Ph.D. Aspirant
21. Startup Founder / AI Innovation Associate

28. Final Curriculum Intent

This curriculum is aligned to the JSS GIFT regulation structure.

It clearly separates:

196 Qualifying Credits

10 Binary Graded Credits

28 Optional Add-on Credits for Integrated M.Sc. with Add-on Graduate Diploma

It accommodates:

- Multiple exits
- Multiple entries
- Pre-Semester as part of Semester I
- L-T-P-SL model
- Technology-integrated learning
- Formative-heavy assessment
- GFA & IFA assessment structure
- Project and capstone orientation

- Binary Graded Courses
- Choice-based Binary Graded Courses
- Add-on Minor, Major and Research Major tracks
- Add-on project / capstone or alternate course option
- M.Sc. Honors extension
- Credit equivalence and credit transfer
- Summer semester flexibility
- Separate degree and Add-on SGPA/CGPA logic
- Prerequisite / readiness mapping for every course

The learner progression is:

Readiness → Foundations → Computing → Data → AI → Machine Learning → Deep Learning → Intelligent Systems → Generative AI → Decision Intelligence → Domain Intelligence → Research → Product Building → Capstone → Future Technology Leadership

The final graduate should not merely know AI.

The final graduate should be able to:

- **Think with science**
- **Reason with data**
- **Build with technology**
- **Research with discipline**
- **Act with ethics**
- **Create with purpose**
- **Lead in the AI era**