

Indian Institute of Technology, Kanpur

Proposal for a New Course

1. Course No.: IS6XX
2. Course Title: **Software engineering for ML/AI**
3. Per Week Lectures: **03** (L), Tutorial: **00** (T), Laboratory: 00(P), Additional Hours [0-2]: __
(A)

Credits ($3*L + 0*T + 0*P + 0*A$) = **09** Duration of course: Full semester

4. Proposing Department / IEP: **DIS**

Other departments which may be interested in the proposed course:

Other faculty members interested in teaching the proposed course:

5. Proposed Instructor(s): **Sruti Srinivasa Ragavan**

6. Course description:

- a. OBJECTIVES: By the end of this course, students will be able to engineer AI/ML systems as reliable, maintainable software systems. They will learn to define requirements, design modular architectures integrating data and ML components, apply design patterns, write clean and testable code, and implement comprehensive testing (unit, integration, UI, load, usability), along with CI/CD, verification, validation, and basic project management. They will also understand the AI/ML lifecycle — including pipelines, reproducibility, versioning, debugging, explainability, and monitoring for issues such as bias, drift, data leakage, and performance degradation.

- b. CONTENTS:

S.No	Topic	# Lectures
1	Introduction: Basics of software engineering, software as systems, and ML models vs. AI-based software systems.	1
2	SDLC – lifecycle processes	3
3	Requirements elicitation and validation	3
4	Code quality – hygiene, good design, automated linting, refactoring, refactoring to design patterns	6
5	Software architecture and architecture patterns	6
6	Data Engineering and Pipelines: ETL, data validation, dataset versioning, preventing data leakage	6
7	Testing: Unit, integration, UI automation, load/stress testing, performance regression testing, robustness testing	6
8	CI/CD and MLOps pipelines: containers, versioning, reproducibility	3
9	Project Management: Estimation, risk management, technical debt, documentation, experimentation vs production trade-offs	3
10	Debugging	3

c. PRE-REQUISITES: Data structures, basic machine learning.

7. Recommended textbooks:

None, readings assigned as articles / papers / code reviews / web resources / chapters from open textbooks.

Dated: 03 March, 2026

Proposer: Sruti Srinivasa Ragavan

Dated: _____

DUGC/DPGC convenor: _____

The course is approved / not approved.

Chairman, SUGC/SPGC

Dated: _____