Vishlesan i-Hub
Indian Institute of Technology, Patna

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Learn in हिन्दी

SOFTWARE DEVELOPMENT ENGINEERING WITH APPLIED AI

FROM VISHLESAN i-HUB, IIT PATNA

About IIT Patna, Vishlesan i-Hub

National Innovation Hub: Vishlesan i-Hub at IIT Patna is part of a national mission, advancing AI in speech, video, and text analytics for sectors like health, education, and security.

Premier Technical Institute: IIT Patna is one of India's top engineering institutes, known for its cutting-edge research and strong academic foundation.

Strong Industry & Research Ecosystem: With active collaborations, incubators, and innovation hubs, IIT Patna bridges academia and industry to drive real-world impact.

Program Overview

The Software Engineering with Applied AI program is a beginner-friendly, industry-aligned certification designed to build strong software engineering fundamentals with applied AI. Students learn Python fundamentals, data structures and algorithms, and develop modern full-stack applications using FastAPI and SQL, along with frontend, backend, databases, and APIs. The program emphasizes the use of AI tools and the integration of Large Language Models into real-world software features, enabling learners to become AI-augmented developers. The learning experience culminates in a hands-on capstone project that strengthens the learner’s portfolio and resume.

Why Choose This Course?

- **Prestigious Certification*:** Receive a Certificate of Completion with Vishlesan i-Hub, IIT Patna, significantly enhancing your profile's value.
- **Real-World Capstone Project:** Work on capstone projects designed to solve practical business challenges.
- **Expert Faculty & Industry Insights:** Learn from IIT faculty & industry experts bringing real-world insights to your learning journey
- **Mentorship & Community Support:** Get guidance from experienced mentors and join a growing community of learners in technology.
- **For Every Learner:** Whether you're a student, working professional or job seeker, this program is accessible for all.
- **Delivery in Hindi:** Learn directly from mentors who speak your language and can simplify complex ideas with local analogies and examples.

**Certificate Eligibility: Minimum 65% overall attendance and 30% marks in cumulative evaluations score*

What Will You Learn?

Begin your software engineering and AI journey with a beginner-friendly, industry-aligned program. Learn Python fundamentals, DSA and build modern full-stack applications using FastAPI and SQL. Become an AI-augmented developer by using AI tools and integrating Large Language Models into real-world features. Ending with a capstone project that boosts your portfolio and resume.

Toolkit

python™ FastAPI Pydantic AI PostgreSQL

Course Summary

Course Duration	Weekly Commitment	Certification
5 months	10 hours per week	From Vishlesan i-Hub, IIT Patna

Course Syllabus

Programming, DSA & AI-Powered Foundations

- **Python Essentials for Modern Developers:** Learn Python from scratch with a focus on writing clean, readable code that developers actually ship in real projects
- **Thinking in Code Logic, Loops & Problem Solving:** Master conditionals, loops and structured thinking to break down real-world problems into simple, executable steps
- **Data Structures Fundamentals:** Get hands-on with fundamental structures like arrays, strings, lists, dictionaries, and hashmaps
- **Applied Algorithmic Thinking (Searching & Sorting):** Focus on the intuition and complexity of core algorithms (e.g., binary search, insertion sort)
- **Git & Collaboration Basics:** Use Git and GitHub to version your code, collaborate with others and showcase your work like a real software engineer
- **GenAI Coding Lab I:** AI for DSA & Problem Solving (The Coding Alternative): Use AI assistants to explain complex DSA concepts, generate pseudocode for algorithms, and provide visual step-by-step solutions, focusing on understanding the intuition before implementation

Programming, DSA & AI-Powered Foundations

- **How the Web and HTTP Work:** Understand the client-server model, HTTP methods, status codes and JSON so you know what happens when a user hits a URL
- **Frontend Essentials: HTML, CSS:** Learn structure and style simple pages
- **Frontend Essentials: JavaScript Interactivity:** Learn JavaScript to make pages interactive and communicate with backend services
- **GenAI Coding Lab II:** AI-Assisted Frontend Development (The Coding Alternative): Leverage AI to generate HTML/CSS layouts, basic JavaScript functions, and debug client-side interaction with APIs

Core Backend, Data & Architecture

- **Building REST APIs with FastAPI:** Create real REST endpoints, handle path and query parameters, and return clean, validated JSON responses
- **Data Validation with Pydantic:** Use Pydantic models to enforce structure, types and constraints on data coming in and going out of your APIs
- **Relational Databases & Data Modeling:** Learn how to design tables, keys and relationships that reflect real-world entities (users, orders, tasks)
- **SQL Fundamentals for Developers:** Write practical SQL queries using SELECT, INSERT, UPDATE, DELETE and simple joins
- **Connecting FastAPI to Databases:** Integrate FastAPI with a relational database using an ORM and build full CRUD endpoints backed by persistent storage
- **GenAI Coding Lab III: AI-Assisted Backend & Documentation (The Coding Alternative):** Use AI for drafting endpoint skeletons, ORM queries, generating example requests/responses, and writing comprehensive API documentation

Applied AI Features & Capstonet

- **Fundamentals of Low-Level & High-Level Design (LLD & HLD):** Structure your backend into clear layers—routes, services and models—and use simple architecture diagrams to visualize data flow
- **LLM Fundamentals for Software Engineers:** Understand what large language models are, how tokens and context windows work, why they hallucinate and how to work with them safely as a developer
- **Building LLM-Backed API Endpoints:** Create your first AI-powered endpoints (e.g., summarize, rewrite or suggest) by calling LLM APIs from FastAPI and returning structured outputs
- **Context Engineering & Prompt Design:** Learn how to craft prompts and context that guide LLMs reliably—what to include, what to avoid and how to reduce hallucinations
- **Personal AI-First Coding Framework & Agentic Concepts:** Design your own repeatable workflow for using AI across design, implementation, debugging and documentation, along with an intro to basic agentic workflows (plan, call tools)
- **Capstone Project:** Dedicated time to build a final, deployable SDE project integrating the full stack (Frontend, Backend, Database, and an LLM-powered feature)

English & Soft Skills Training

Everyday English for Self-Expression

Learn how to talk about yourself comfortably and confidently in common situations.

- **Talking About Your Present:** Learning to speak about who you are, your education/work, family, hobbies, routine and current activities in everyday situations, using the present tense
- **Talking About Past Experiences:** Forming clear sentences using the past tense to describe past education, work, choices, and general life experiences, clearly and confidently
- **Talking About Your Future:** Expressing future goals, plans, and actions in a simple and confident way with the future tense.
- **Connecting Past, Present, And Future:** Linking ideas while speaking, to connect past, present, and future naturally while maintaining flow and clarity

Building Clear and Correct Sentences

Strengthen sentence formation so your English sounds natural and complete.

- **Applying Articles & Commonly Used Prepositions:** Using articles & prepositions accurately in everyday and professional contexts.
- **Describing Skills, People, and Situations With Adjectives:** Using adjectives and descriptive phrases to explain skills, qualities, roles, and situations more clearly.
- **Forming Longer, Meaningful Sentences:** Constructing complex sentences by joining ideas, instead of speaking in short or incomplete statements.
- **Speaking with Confidence in English:** Building confidence while speaking, by managing hesitation, self-correction, and fear of grammatical mistakes.

Speaking with Impact and Awareness

Learn to organise thoughts, speak smoothly, and communicate with confidence.

- **Structured Speaking and Thinking on the Spot:** Organising thoughts using simple speaking structures to respond clearly during impromptu or unprepared situations.
- **Asking Questions Effectively:** Understanding how to form clear and appropriate questions and choose suitable question structures while speaking.
- **Reducing Fillers and MTI:** Becoming aware of methods to reduce filler words and MTI to improve clarity while speaking.
- **Body Language and Presence While Speaking:** Using posture, eye contact, tone, and awareness, to be taken seriously while speaking

Professional Communication & Soft Skills

Apply spoken English skills to professional and workplace-like situations.

- **Storytelling for Everyday and Professional Situations:** Explaining processes, experiences, and projects in a structured and engaging way.
- **Expressing Opinions and Viewpoints:** Forming opinion-based sentences using reasons, examples, and comparisons in a clear and professional manner.
- **Having Professional Conversations:** Practising polite sentence patterns and appropriate language for workplace-style conversations.
- **Core Workplace Skills:** Understanding time management, teamwork, and basic workplace behaviour.

Instructors

Shruti Grover

Software Engineer, Microsoft

Shruti is a dynamic Software Engineer with a strong foundation in full-stack development, system design and scalable product engineering.

Tanishq Gupta

SDE II, Amazon

Tanishq is a results-driven Software Engineer experienced in building high-scale backend systems and distributed services.

Aman Raj

Senior Application Engineer, Oracle

Aman is a seasoned application engineer specialising in enterprise software and robust backend solutions.

Vijeet Katogi

Assistant Professor, CSE, IIT Dharwad

Vijeet is an academic and practitioner with deep expertise in computer science fundamentals and applied system design.

Dr. Asif Ekbal

Associate Professor, CSE, IIT Patna

Dr. Asif is a renowned AI researcher and educator with strong expertise in NLP and applied artificial intelligence.

Admission Process

Clear Qualifier Test
Clear the qualifier test to be eligible for the program.

Complete Counselling
Only shortlisted candidates go through the counselling process.

Start Learning
Learn from India's top educators and stand out from the crowd.

Fees Structure

Qualifier Test Fee (Non-Refundable)	₹49

	Option 1	Option 2
	Upfront	**EMI** (Through our NBFC partners)
Secure Seat Fee (Non-Refundable)	₹2,000	₹2,000
Programme Fee (Non-Refundable)	₹23,000	₹8,126 x 3 months
Total	₹25,000*	₹26,378*

**GST at 18% extra, as applicable*

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