# AI TOOLS RESEARCH FOR BSc PROGRAM

## Program Context and Student Profile

Futurense BSc Programs Overview

Futurense offers several BSc programs designed for students passionate about technology and AI:

**BS/BSc in Applied AI and Data Science (IIT Jodhpur):** A 3- 4 years hybrid program focusing on applied AI, data science, machine learning, NLP, and GenAI. Students work on real-world projects with IIT faculty and gain exposure to 100+ AI tools. No JEE required; students can qualify through a qualifier exam.

**BSc Computer Science**: A 3-year undergraduate program focusing on computing fundamentals including programming, software development, algorithms, data structures, and networking. Designed for students with PCM background.

**BSc Information Technology:** A 3-year program covering computer programming, software engineering, database management, cybersecurity, and networking with practical, hands-on approach.

## Target Student Demographics

The typical Futurense BSc student profile includes:

**Educational Background:** 10+2 with science stream (PCM/PCMB), 50% minimum aggregate

**Age Range**: 17-22 years, primarily fresh high school graduates

**Technical Proficiency**: Ranges from beginners (no coding experience) to intermediate learners

**Career Goals**: Aspiring data scientists, AI engineers, software developers, and IT professionals

**Learning Style**: Project-based, hands-on learning with industry mentorship

## Learning Objectives

Students in these programs are expected to develop competencies in:

Programming fundamentals (Python, R, SQL, JavaScript)

AI and machine learning model development

Data analysis, visualization, and interpretation

Generative AI and prompt engineering

Real-world problem-solving through projects

Industry-ready technical and soft skills

**AI TOOLS:**

**1. GitHub Copilot - AI Programming Assistant**

GitHub Copilot is an AI-powered programming assistant developed by OpenAI and Microsoft, built on the OpenAI Codex model. It provides real-time code suggestions and completions directly within the development environment, making it an invaluable tool for learning programming and accelerating development workflows.

**Key Features**

Intelligent code autocompletion across 12+ programming languages including Python, JavaScript, Java, and SQL

Natural language to code conversion - describe what you want and get working code

Context-aware suggestions based on your existing codebase

Debugging assistance and error correction

Code documentation generation

Support for multiple IDEs (VS Code, JetBrains, Neovim)

Learning from millions of public repositories for best practices

**2. ChatGPT / Claude - Conversational AI for Learning**

ChatGPT (OpenAI) and Claude (Anthropic) are advanced large language models that serve as versatile AI assistants for education. These tools excel at explaining concepts, debugging code, generating content, and providing personalized tutoring across virtually any technical subject.

**Key Features**

Natural language interaction for asking questions and getting explanations

Code generation, debugging, and optimization across multiple programming languages

Mathematical problem-solving and step-by-step explanations

Research assistance and literature review support

Writing assistance for technical documentation and reports

Data analysis guidance and visualization recommendations

Personalized learning paths based on student questions

Available 24/7 for on-demand assistance

### 3. Deepnote - AI-Powered Data Science Notebook

Deepnote is a cloud-based data science notebook platform enhanced with AI capabilities. It provides an collaborative environment for data analysis, visualization, and machine learning with built-in AI assistance for code generation, debugging, and analysis.

**Key Features**

AI-powered code generation and autocomplete

Automatic error detection and fixing

Natural language to SQL and Python code conversion

Integrated data visualization tools

Real-time collaboration (Google Docs for data science)

Cloud computing resources included

Version control and sharing capabilities

Pre-installed popular libraries (pandas, scikit-learn, TensorFlow)

Integration with databases and cloud storage

### 4. Whisper (OpenAI)

Whisper is an open-source Automatic Speech Recognition (ASR) system developed by OpenAI. It converts spoken language into written text and supports multiple languages and accents. Whisper is widely used in voice-based AI applications and accessibility tools.

**Key Features**

High-accuracy speech-to-text conversion

Supports multiple languages and accents

Handles noisy audio effectively

Can transcribe long audio files

Open-source and Python-friendly

### 5. ElevenLabs

ElevenLabs is an advanced AI text-to-speech platform that generates natural and human-like voice outputs. It is widely used for voice assistants, narration, and AI-based audio content creation.

**Key Features**

High-quality, realistic voice generation

Multiple voice styles and accents

Voice cloning capabilities

API support for application integration

Fast text-to-speech processing

### 6. Looker Studio

Looker Studio (formerly Google Data Studio) is a data visualization and business intelligence tool that allows users to create interactive dashboards and reports from multiple data sources.

**Key Features**

Interactive dashboards and charts

Integration with Google Sheets, CSV, databases

Real-time data updates

No-code / low-code interface

Shareable and collaborative reports

### 7. Notion AI

Notion AI is an AI-powered productivity assistant integrated within Notion. It helps users generate content, summarize information, organize tasks, and manage documentation efficiently.

**Key Features**

AI-generated summaries and notes

Task planning and content generation

Context-aware writing assistance

Supports project documentation

Improves academic and professional productivity

### 8. Zapier

Zapier is an automation platform that connects different applications and automates workflows using triggers and actions. It enables AI-powered automation without requiring coding skills.

**Key Features**

No-code workflow automation

Integration with thousands of apps

Trigger-based actions and workflows

AI-assisted automation features

Reduces manual and repetitive tasks

### 9. Data Squirrel

Data Squirrel is an AI-assisted data analysis tool that helps users analyze datasets and generate insights automatically. It is designed for beginners and non-technical users.

**Key Features**

Automated data analysis

Insight and trend detection

Supports CSV and structured datasets

Beginner-friendly interface

Reduces dependency on complex coding

### 10. Flourish

Flourish is a no-code interactive data visualization platform that lets users turn raw data into engaging charts, maps, and visual stories without needing to write code. It's widely used for creating immersive interactive visuals that can be embedded in reports, websites, presentations, and social media. Flourish is designed to democratize data storytelling so that students, journalists, analysts, and teams can present insights in visually compelling ways.

**Key Features**

No Coding Required

Interactive Visualizations

Large Template Library

Map & Geospatial Visualizations

Data Storytelling

Live Data Integration

## WORKFLOWS

**Workflow 1: AI-Assisted Programming & Problem-Solving Workflow**
**Objective:**
Enable BSc students to learn programming faster and write industry-standard code.
**Tools Used**

- ChatGPT / Claude
- GitHub Copilot
- Deepnote

**Workflow Steps**

1. Student receives a problem statement (e.g., data manipulation or algorithm task)
2. Uses **ChatGPT** to understand the concept and logic
3. Writes code in **VS Code with GitHub Copilot** for real-time suggestions
4. Tests and refines code inside **Deepnote notebooks**
5. Uses AI debugging suggestions to fix errors
6. Final code is pushed to GitHub for portfolio building

**Outcome**

- Improved coding confidence
- Faster learning curve
- Clean, documented code
- Portfolio-ready repositories

**Workflow 2: Data Analysis & Visualization Workflow**

**Objective:**

Teach students how to convert raw data into insights and dashboards.

**Tools Used**

- Deepnote
- Data Squirrel
- Looker Studio
- Flourish

**Workflow Steps**

1. Student uploads dataset (CSV / Google Sheets)
2. Uses **Data Squirrel** for automated insights and trend detection
3. Performs deeper analysis using **Deepnote (Python, pandas)**
4. Creates dashboards in **Looker Studio**
5. Builds interactive visual stories using **Flourish**
6. Embeds visuals into reports or presentations

**Outcome**

- Strong analytical thinking
- Hands-on data storytelling skills
- Industry-style dashboards
- Real-world analytics exposure

**Workflow 3: AI-Powered Research & Documentation Workflow**

**Objective:**

Help students with academic research, reports, and project documentation.

**Tools Used**

- ChatGPT / Claude
- Notion AI
- GitHub

**Workflow Steps**

1. Student defines a research or project topic
2. Uses **ChatGPT** for literature review and concept clarity
3. Organizes notes and summaries using **Notion AI**
4. Drafts reports, README files, and documentation
5. Stores all deliverables in GitHub repository

**Outcome**

- Better research skills
- Structured documentation habits
- Academic + industry writing readiness

**Workflow 4: Voice-Based AI Application Workflow**

**Objective:**

Introduce students to voice AI and real-world AI applications.

**Tools Used**

- Whisper
- ElevenLabs
- Python

**Workflow Steps**

1. Student records or uploads audio input
2. Uses **Whisper** to convert speech to text
3. Processes text using Python / AI logic
4. Converts responses to speech using **ElevenLabs**
5. Builds a simple voice-based assistant or application

**Outcome**

- Exposure to multimodal AI
- Understanding of speech-based AI systems
- Practical GenAI application development

**Workflow 5: AI Automation & Productivity Workflow**

**Objective:**

Teach students how AI automates repetitive academic and professional tasks.

**Tools Used**

- Zapier
- Notion AI
- Google Workspace

**Workflow Steps**

1. Student sets a trigger (new form submission / dataset update)
2. **Zapier** automates task execution
3. Notion AI summarizes updates
4. Auto-generated reports or notifications are created
5. Workflow runs without manual intervention

**Outcome**

- Automation mindset
- Productivity enhancement
- No-code workflow experience

**Workflow 6: End-to-End Capstone Project Workflow**

**Objective:**

Combine all tools into a single real-world project.

**Tools Used**

- ChatGPT
- GitHub Copilot
- Deepnote
- Looker Studio / Flourish
- Notion AI

**Workflow Steps**

1. Problem definition using ChatGPT
2. Dataset analysis in Deepnote
3. Coding with GitHub Copilot
4. Visualization using Looker Studio / Flourish
5. Documentation using Notion AI
6. Final demo and project submission

**Outcome**

- Industry-style project experience
- Strong portfolio artifact
- Job & higher-studies readiness