Five-Level Applied AI Learning Pathway

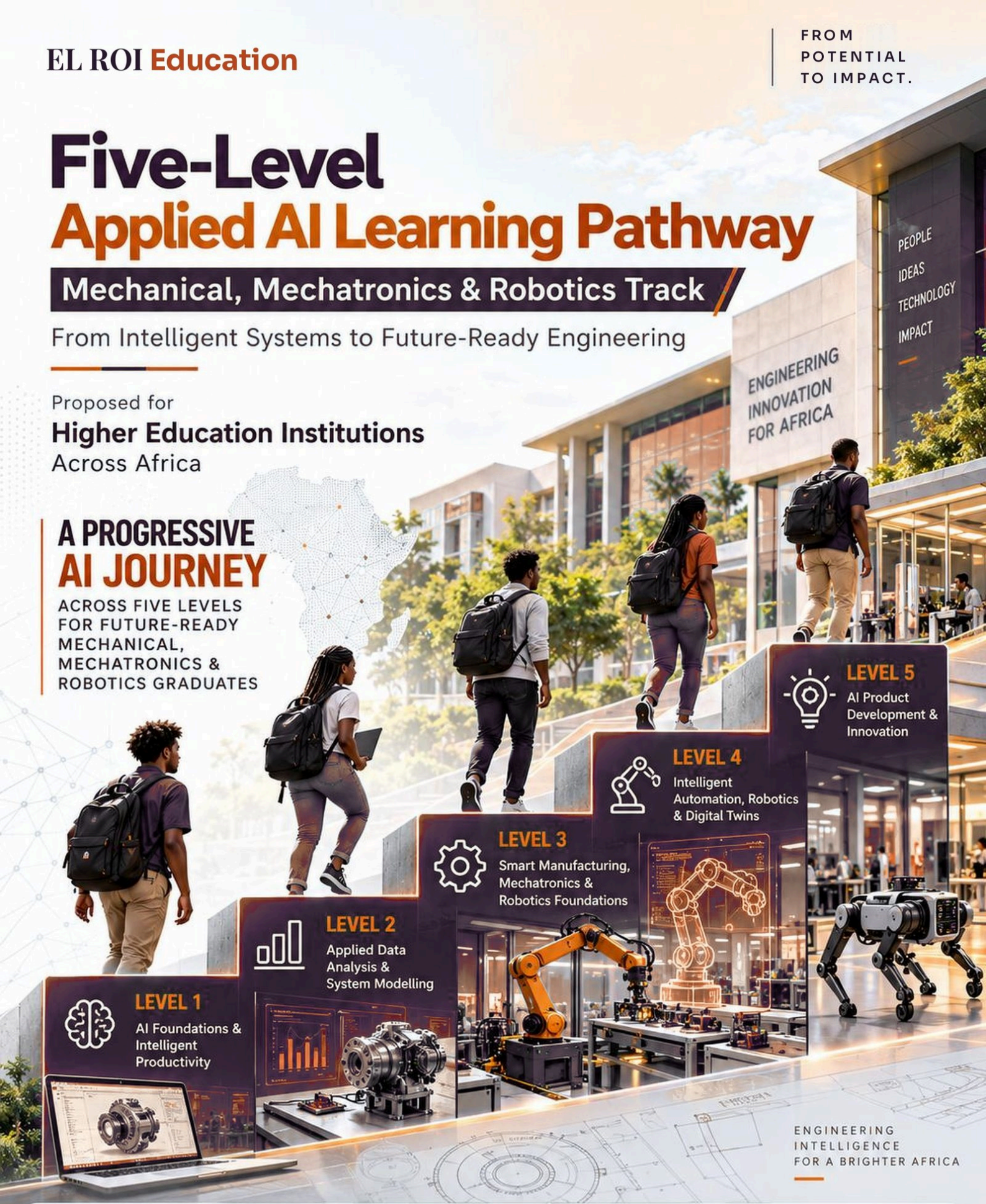
Mechanical, Mechatronics & Robotics Track

From Intelligent Systems to Future-Ready Engineering

Proposed for
Higher Education Institutions
Across Africa

A PROGRESSIVE AI JOURNEY

ACROSS FIVE LEVELS FOR FUTURE-READY MECHANICAL, MECHATRONICS & ROBOTICS GRADUATES



75 Hours per Level
30 Hours Theory + 45 Hours Hands-on

Flexible Delivery

Real-World Projects

Industry-Oriented Certification Readiness

Productivity AI Tools in Every Level

El Roi Nexus AI Platform



Executive Summary & Program Objectives

Mechanical, Mechatronics & Robotics Track

Empowering Future-Ready Mechanical, Mechatronis & Robotics Students Through a Structured AI Learning Journey

Executive Summary

This **five-level** applied AI learning pathway equips students from mechanical engineering, mechatronics, robotics, manufacturing, industrial, automotive and related disciplines with progressive AI capabilities, from AI literacy and productivity to engineering data analysis, smart manufacturing, intelligent automation, robotics, digital twins and AI product innovation. Each level is 75 hours (30 hours theory + 45 hours hands-on), designed for higher education institutions across Africa and supported by El Roi Nexus AI with guided content.

Target Audience

ENGINEERING DISCIPLINES FOR AN AI-ENABLED TOMORROW

- Mechanical Engineering
- Mechatronics Engineering
- Robotics & Automation
- Manufacturing Engineering
- Automotive Engineering
- Industrial Engineering
- Product Design / Design Engineering
- Related Engineering Programs

Program Objectives

FROM AI LEARNING TO REAL ENGINEERING IMPACT

1. Build AI literacy and digital productivity for engineering students.
2. Develop engineering data analysis and decision-support capability.
3. Enable domain-specific AI applications for mechanical, manufacturing and robotics systems.
4. Prepare students for intelligent automation, robotics and product innovation.
5. Strengthen portfolio, certification awareness and career readiness for evolving engineering roles.

Key Highlights

A COMPREHENSIVE, PRACTICAL AND INDUSTRY-RELEVANT LEARNING EXPERIENCE

- **5** Progressive Levels
- **375** Total Learning Hours
- **150** Hours Theory
- **225** Hours Hands-on
- **Productivity AI Tools** Embedded
- **Real-World Engineering** Use Cases

Student Transformation Journey

PROGRESSIVE SKILLS. REAL CAPABILITIES. BRIGHTER FUTURES.



Program Architecture & Five-Level Roadmap

From Intelligent Systems to Future-Ready Engineering

A STRUCTURED AI JOURNEY

BUILDING SKILLS FOR REAL-WORLD IMPACT



Academic Structure per Level

30 Hours Theory per Level
+ 45 Hours Hands-on per Level

75 Hours Total per Level

Total Program Engagement

375 Total Learning Hours Across Five Levels
(75 Hours × 5 Levels)

Flexible Delivery Options

- Semester-integrated delivery
- Modular bootcamps
- Blended faculty-supported format

Program Summary — Level-Wise Focus

LEVEL 1
AI Foundations & Intelligent Productivity

- AI basics and key concepts
- Prompting techniques
- Productivity tools
- Engineering use cases

LEVEL 2
Applied Data Analysis & System Modelling

- Data analysis fundamentals
- Visualisation and dashboards
- AI-supported decisions
- System modelling for engineering problems

LEVEL 3
Smart Manufacturing, Mechatronics & Robotics Foundations

- Smart manufacturing concepts
- Sensors and data acquisition
- Robotics workflows
- Engineering knowledge systems

LEVEL 4
Intelligent Automation, Robotics & Digital Twins

- Automation workflows
- Robotics integration
- Digital twins and simulation
- Process improvement and optimisation

LEVEL 5
AI Product Development & Innovation

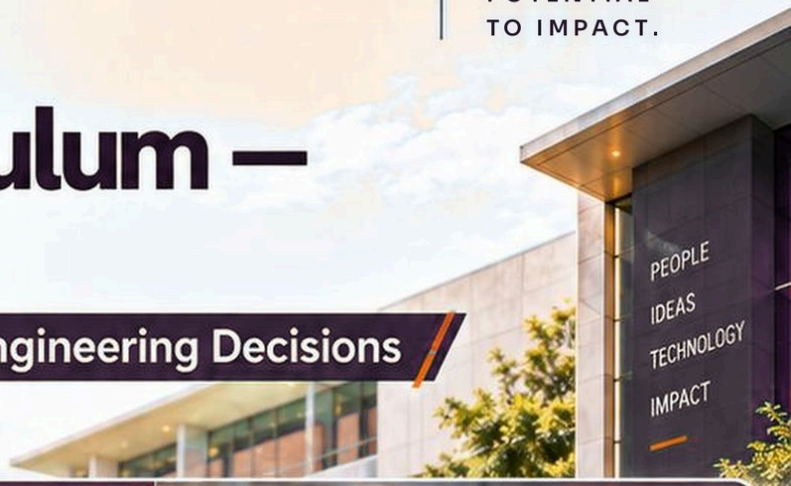
- AI product lifecycle
- Prototyping and validation
- Deployment and scaling
- Capstone innovation project

Key Highlights

- Productivity AI Tools
- Real-World Mini-Projects
- Portfolio-Ready Outcomes
- Faculty Enablement Compatible
- El Roi Nexus AI Platform Support

Detailed Curriculum — Levels 1 & 2

From AI Literacy to Data-Driven Engineering Decisions



LEVEL 1

AI Foundations & Intelligent Productivity

Build strong AI foundations and use AI tools for smarter academic and personal productivity.



Industry Skills Covered

- What is AI and how it works
- Types of AI and engineering examples
- Prompt engineering basics
- AI productivity tools
- Research assistance
- Document drafting
- Presentations
- Spreadsheet support
- Responsible AI and ethics

Hands-on Use Cases

- Summarize technical datasheets and component notes
- Create study notes and flashcards
- Prepare presentations and lab reports
- AI-powered communication and email drafting
- Research and interview preparation

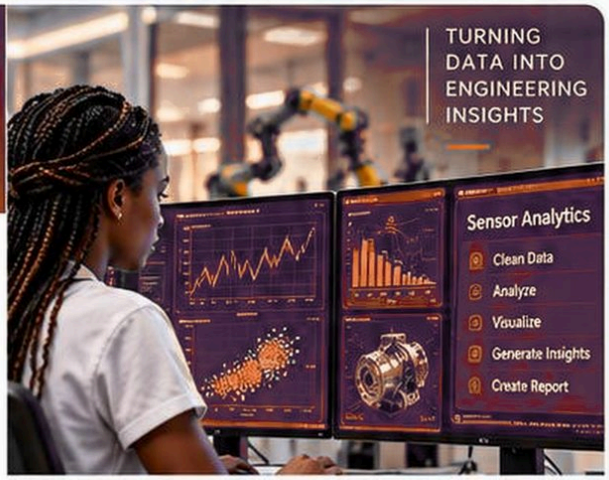
Outcome

Learners confidently use AI tools for learning, communication and productivity.

LEVEL 2

Applied Data Analysis & System Modelling

Develop data skills and apply AI to analyze information and generate engineering insights.



Industry Skills Covered

- Data basics and data types
- Working with datasets
- Data analysis with Python or no-code tools
- Visualization and storytelling
- AI for engineering, production and energy analysis
- Intro to dashboards and reporting
- Document intelligence
- AI for research and decision support

Hands-on Use Cases

- Analyse sensor and machine data
- Generate insights from lab or survey data
- Create interactive dashboards
- Research and compare engineering information
- Automate technical reporting

Outcome

Learners work with real-world data, create visualizations and use AI to support academic and engineering decisions.

75 Hours per Level
30 Hours Theory + 45 Hours Hands-on

Flexible Delivery

Real-World Projects

Industry-Oriented Certification Readiness

Productivity AI Tools in Every Level

El Roi Nexus AI Platform

Detailed Curriculum — Levels 3 & 4

From Smart Systems to Intelligent Automation

LEVEL 3 — Smart Manufacturing, Mechatronics & Robotics Foundations

Apply AI to smart manufacturing and intelligent mechanical systems.

Industry Skills Covered

- Intro to machine learning for engineering
- Computer vision basics
- Sensors and actuators
- IoT and edge concepts
- Robotics workflows
- Simulation basics
- Engineering knowledge assistants and document intelligence
- Intro to multimodal AI for engineering

Hands-on Use Cases

- Build a predictive maintenance prototype
- Create a defect detection vision model
- Build a robotic-cell monitoring dashboard
- Create a knowledge assistant for machine manuals
- Design a simple smart system concept

Outcome

Learners build useful domain-focused AI applications for mechanical, mechatronics and robotics use cases.



LEVEL 4 — Intelligent Automation, Robotics & Digital Twins

Design and implement AI-driven automation systems for industrial and real-world applications.

Industry Skills Covered

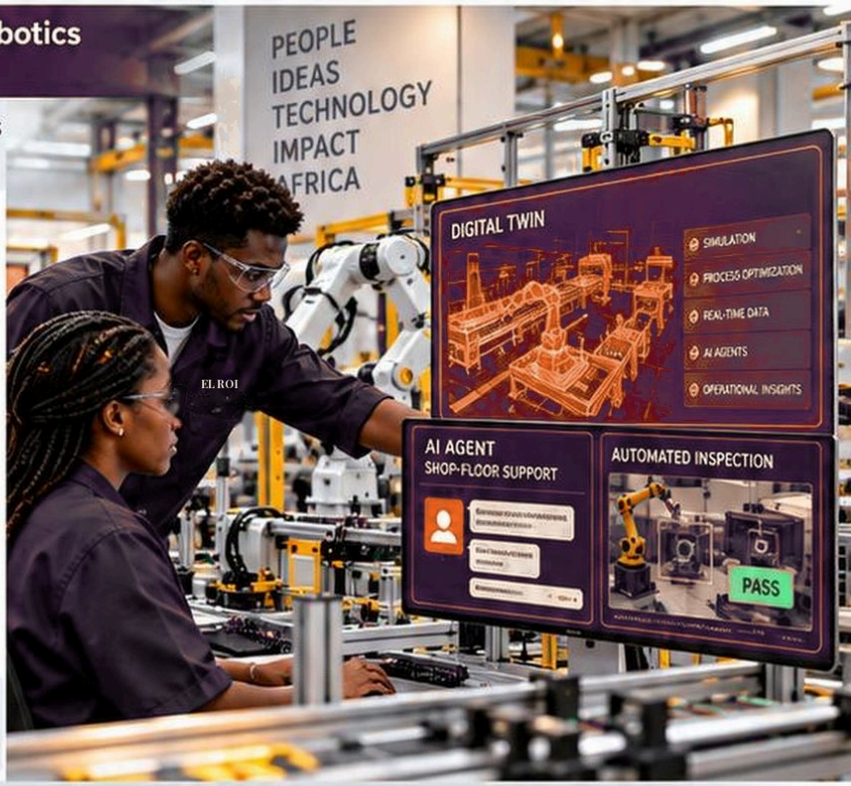
- AI agents and tool calling
- Industrial automation workflows
- Robotics integration concepts
- Digital twins and simulation
- Process optimization
- No-code / low-code automation
- Human-in-the-loop workflows
- Governance, safety and responsible AI

Hands-on Use Cases

- Automate a maintenance workflow
- Build an AI assistant for shop-floor support
- Create an automated inspection workflow
- Design a digital twin concept for line optimization
- Build a multi-step assistant for operations support

Outcome

Learners design and build agents and automation solutions that reduce repetitive work and improve efficiency.



Flexible Delivery | Faculty-Supported Adoption | Industry-Oriented Learning | Portfolio Development | El Roi Nexus AI Platform Access

Detailed Curriculum — Level 5 & Capstone Studio

Advanced Applied AI, Innovation & Real-World Impact

LEVEL 5

AI Product Development & Innovation

Apply end-to-end AI product development skills to create impactful solutions for mechanical, mechatronics and robotics use cases.

Industry Skills Covered

- AI product design and user-centric thinking
- Problem framing and domain discovery
- Rapid prototyping and MVP development
- Integrating AI models and APIs
- Low-code or no-code solution building
- Solution testing and iteration
- Deployment fundamentals
- Measuring impact and ROI
- Future trends in AI and engineering career pathways

Hands-on Use Cases

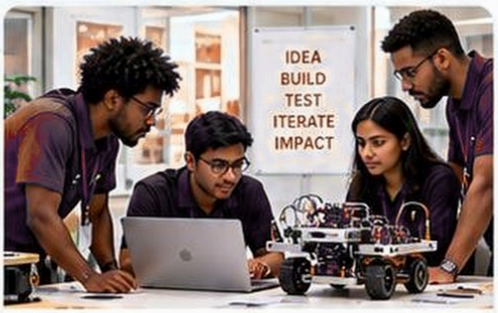
- Build a mini AI-powered engineering application
- Create a research or industry MVP
- Develop a smart manufacturing, robotics or mechanical use-case solution
- Solve a local challenge through AI
- Present a showcase-ready prototype

Learner Outcome

Learners design, build, test and present an end-to-end applied AI product or innovation concept.



Integrated Capstone Studio



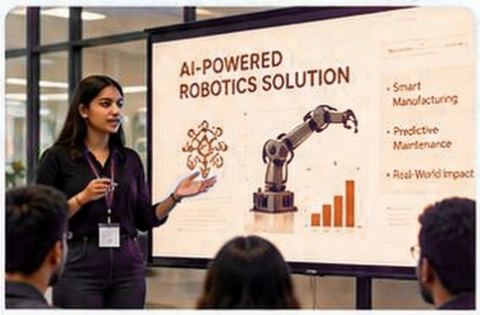
Capstone Components

- Problem selection
- Solution scoping and planning
- Data/content setup
- Workflow design and implementation
- Testing and iteration
- Demo day presentation



Platform & Tool Exposure

- El Roi Nexus AI platform
- Prompt tools and AI assistants
- Dashboards and analytics tools
- No-code/low-code tools
- APIs and integrations
- Collaboration and project management tools



Final Deliverables

- Working prototype
- Presentation deck with impact analysis
- Documentation
- Portfolio artifact

75 Hours for Level 5
30 Hours Theory +
45 Hours Hands-on

Project-Based Learning

Industry-Oriented Certification

El Roi Nexus AI Platform

FROM POTENTIAL TO IMPACT.

Delivery Model & Learning Experience

Flexible. Practical. Future-Ready.

A blended, hands-on learning experience designed for mechanical, mechatronics and **robotics graduates** to build real AI skills, work on practical projects and gain career-ready competencies for intelligent engineering systems, automation and innovation.



1. DELIVERY OPTIONS

Immersive Modular Delivery



- 5 to 6 day intensive blocks
- guided practice and mini-projects
- on-campus delivery
- faculty supported

Embedded Academic Delivery



- weekly or periodic sessions integrated into the academic calendar
- blended delivery
- continuous lab practice
- platform enabled

2. LEARNING METHODOLOGY

01 Learn
Learn concepts and best practices

02 Experiment
Experiment in hands-on labs with guided notebooks

03 Build
Build mini-projects to apply skills

04 Apply
Apply to real mechanical and robotics use cases

05 Demonstrate
Demonstrate solutions, get feedback and build a portfolio

3. HANDS-ON COMPONENTS

- Coding & No-Code Labs
- Guided Notebooks
- Prompt Labs
- Mini-Projects
- Assignments
- Capstone Development
- Faculty Mentoring
- Platform Access

4. PROGRAM DELIVERY HIGHLIGHTS

- 75 Hours per Level
- 30 Hours Theory
- 45 Hours Hands-on
- Real-World Use Cases Across Disciplines
- Project-Based Progression

Projects, Assessment & Certification Readiness

Learn | Build | Showcase | Get Certified | Be Career Ready

From Hands-On Projects to Industry-Ready Engineers

REAL PROJECTS
REAL SKILLS
REAL OPPORTUNITIES
ACROSS AFRICA



Project Progression Roadmap

A hands-on journey from simple tasks to real-world innovation.

LEVEL 1
AI Productivity Mini Project

Use AI tools to solve a simple engineering task and improve productivity.

LEVEL 2
Data Analysis & Insight Mini Project

Analyse real data from mechanical / electrical / manufacturing systems and extract meaningful insights.

LEVEL 3
Smart Systems or Robotics Project

Build a domain-focused prototype using sensors, computer vision, smart monitoring or manufacturing intelligence.

LEVEL 4
Automation, Robotics or Digital Twin Project

Design and build an automated workflow or agent-supported system for industrial operations.

LEVEL 5
Capstone AI Product or Innovation Demo

Develop a complete solution addressing a real-world engineering problem and showcase it.

Assessment Framework

Continuous assessment to track your learning and project progress.

20%	20%	25%	25%	10%
Participation & Attendance	Quizzes	Guided Labs	Mini-Projects	Final Project / Demo

Certification Readiness

Build in-demand skills and prepare for industry-recognised certifications.

Foundation Stage

- AI awareness and ecosystem understanding
- Prompt engineering fundamentals
- Data literacy for engineering applications
- Responsible AI basics

Advanced Stage

- AI application development for engineering use cases
- GenAI and RAG systems
- Agentic systems awareness
- Analytics and workflow automation

Key Outcomes for You

Gain practical skills, real experience and a stronger foundation for your engineering career.

Portfolio-ready artifacts

Projects, code, reports and demos to showcase your skills.



Stronger AI productivity

Work smarter with AI tools and automation in engineering tasks.



Real project exposure

Hands-on experience with industry-relevant use cases and hardware.



Improved employability

Be job-ready with in-demand skills, certifications and a strong portfolio.



75 Hours per Level
30 Hours Theory + 45 Hours Hands-on

Flexible Delivery

Real-World Projects

Industry-Oriented Certification Readiness

Productivity AI Tools in Every Level

El Roi Nexus AI Platform

FROM POTENTIAL TO IMPACT.



Commercial Model, Roles & Institutional Impact

A Flexible Pathway for Scalable AI Enablement in Higher Education

1 Commercial Model

FLEXIBLE. TRANSPARENT. SCALABLE.

Per-Student Pricing
Transparent, affordable pricing per student.

Per-Level Engagement
Pricing options based on individual or multi-level engagement.

Bundled Programs
Cost-effective bundles across multiple levels.

Annual Platform Access Options
Institution-wide or cohort-based platform plans.

Faculty Enablement Add-ons
Optional training, certification and support for faculty and academic staff.

Custom Implementation Support
Onboarding, integration and program design support.

Final commercials depend on cohort size, program scope, delivery model and any customization or integration requirements.

2 Roles & Responsibilities

COLLABORATIVE PARTNERSHIP FOR GREATER IMPACT

El Roi Education Responsibilities

- Provide platform access and technical infrastructure.
- Design and curate content and curriculum.
- Develop guided learning assets.
- Provide assessment templates and rubrics.
- Share real-world project frameworks.
- Support faculty onboarding and enablement.
- Provide progress reporting and learning analytics.



Institution / Partner Responsibilities

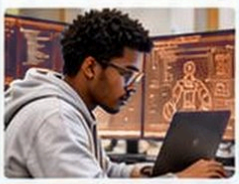
- Student enrolment and cohort management.
- Classroom/lab/infrastructure coordination.
- Faculty facilitation and student support.
- Academic scheduling and calendar alignment.
- Local mentoring and project guidance.
- Attendance and participation tracking.
- Approvals and governance support.



3 Institutional Impact

MEASURABLE OUTCOMES FOR A BRIGHTER AFRICA

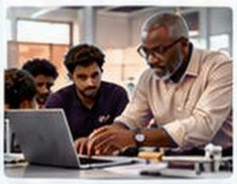
AI-Enabled Student Learning



Stronger Project Portfolios



Faculty-Supported Adoption



Internship & Innovation Readiness



Improved Employability



Scalable AI Adoption



Mechanical, Mechatronics & Robotics AI Readiness Outcomes

Students progress from AI literacy to real-world engineering AI application, automation and innovation, ready for modern workplaces and advanced study.



- **75 Hours per Level** — 30 Hours Theory + 45 Hours Hands-on
- **Flexible Delivery**
- **Real-World Projects**
- **Industry-Oriented Certification Readiness**
- **Productivity AI Tools in Every Level**
- **El Roi Nexus AI Platform**