



ROCHESTON AI UNIVERSITY PARTNERSHIP MODEL

COMPREHENSIVE ARTIFICIAL INTELLIGENCE & MACHINE LEARNING PROGRAMS CATALOG

2026 - 2027 Academic Year

Bachelor of Science | Master of Science | Graduate Diploma | Professional Certificates

Powered by the Rocheston AI Cybernotes & the AINA Engine

RCAI Certification | Competency-Based Certification Pathway | Curriculum aligned to NIST AI RMF & the EU AI Act

This catalog is a comprehensive reference for partner universities adopting the Rocheston Artificial Intelligence Academic Framework. All programs, course codes, descriptions, credit structures, and lab requirements are designed for direct integration into existing university systems. Partner institutions may customize program names, elective offerings, and scheduling while maintaining the core Rocheston curriculum architecture.

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1. About the Rocheston AI Academic Partnership

The Living Curriculum Advantage

Artificial intelligence moves faster than any field in the history of computing. A new foundation model, a new fine-tuning technique, or a new regulatory framework can render a traditional textbook obsolete before it ships. Universities spend 18 to 24 months building AI curriculum that is out of date the day the first student enrolls. The Rocheston AI Academic Partnership eliminates that gap entirely.

Through the Rocheston AI Cybernotes platform, every lecture, lab notebook, dataset, and assessment is updated continuously. When a frontier model is released, when a new attack on LLMs is published, or when a regulation like the EU AI Act enters a new enforcement phase, the curriculum is rapidly updated, with new material targeted within 48 hours. Students learn from today's state of the art, not last year's models.

What Partner Universities Receive

- Complete course syllabi with learning objectives mapped to widely recognized public AI frameworks, including the NIST AI Risk Management Framework and the OWASP Top 10 for LLM Applications
- Rocheston AI Sphere access: GPU-powered notebook environments, model training clusters, and live agentic-AI sandboxes
- Rocheston AI Cybernotes: continuously updated digital textbooks, recorded technical lectures, and hands-on labs
- RCAI certification pathway embedded directly into degree programs
- AINA Engine access: Rocheston's proprietary agentic orchestration platform for applied coursework
- AINA OS and Rose X OS lab environments pre-configured for every course
- Faculty training and certification support
- Annual curriculum review and refresh by Rocheston's AI research team
- Marketing collateral, recruitment support, and employer partnership network

Recognition & Framework Alignment

The RCAI (Rocheston Certified Artificial Intelligence Engineer) credential is a competency-based certification whose curriculum is aligned to widely recognized public AI frameworks, including the NIST AI Risk Management Framework and the risk tiers of the EU AI Act. Every graduate of an RCAI-aligned program demonstrates skills that map to the capabilities AI employers and governance teams increasingly look for.

The Catalog at a Glance

This framework draws on a library of 305 modular AI courses spanning 20 specialization domains, from AI Foundations and Machine Learning to Generative AI, MLOps, Computer Vision, NLP & Retrieval, Reinforcement Learning, Responsible AI, Edge AI, and AI Security. Partner universities can assemble these modules into the degrees, diplomas, and certificates described in this catalog, or compose their own programs from the same building blocks.

2. Program Overview Matrix

Program	Type	Credits	Duration	Format	RCAI Level
B.S. Artificial Intelligence Engineering	Bachelor	120	4 Years	On-Campus / Hybrid	Level 1 & 2
B.S. Machine Learning & Data Science	Bachelor	120	4 Years	On-Campus / Hybrid	Level 1 & 2
M.S. Applied Artificial Intelligence	Master	36	18 Months	Online / Hybrid	Level 3
M.S. Generative AI & LLMs	Master	36	18 Months	Online / Hybrid	Level 3
M.S. AI Engineering & MLOps	Master	36	18 Months	100% Online	Level 3
Grad. Diploma: Generative AI & LLM Eng.	Diploma	24	12 Months	Online / Hybrid	Level 2
Grad. Diploma: Responsible AI & Governance	Diploma	24	12 Months	100% Online	Level 2
Grad. Diploma: Computer Vision & Perception	Diploma	24	12 Months	Online / Hybrid	Level 2
Cert: AI Foundations	Certificate	N/A	16 Weeks	Bootcamp	Level 1
Cert: Generative AI & Prompt Engineering	Certificate	N/A	12 Weeks	Online	Level 2
Cert: MLOps & Production AI Engineering	Certificate	N/A	14 Weeks	Online	Level 2
Cert: Computer Vision Engineering	Certificate	N/A	12 Weeks	Online	Level 2
Cert: NLP & Retrieval-Augmented Generation	Certificate	N/A	12 Weeks	Online	Level 2
Cert: Business AI & Product	Certificate	N/A	10 Weeks	Online	Level 1
Cert: Edge AI & Embedded Intelligence	Certificate	N/A	12 Weeks	Online / Hybrid	Level 2
Cert: AI Security & Privacy Engineering	Certificate	N/A	12 Weeks	Online	Level 2
Cert: Data Engineering for AI	Certificate	N/A	12 Weeks	Online	Level 2

Partner universities may adopt any subset of these programs, rename them to fit institutional conventions, and combine modules into custom pathways. All certificates are stackable into the graduate diplomas and master's degrees.

3. Bachelor of Science in Artificial Intelligence Engineering (B.S.AIE)

Program Mission

The Bachelor of Science in Artificial Intelligence Engineering prepares students to design, build, deploy, and govern intelligent systems for modern enterprises. Unlike traditional computer science programs that treat machine learning as a single elective, this program embeds AI engineering thinking into every course from day one. Graduates emerge as AI-first engineers capable of training models, shipping them to production, evaluating them rigorously, and operating them responsibly at scale.

Program Learning Outcomes (PLOs)

Upon completion of this program, graduates will be able to:

- Build, train, and evaluate machine learning and deep learning models across tabular, text, vision, and audio data
- Engineer generative AI applications using foundation models, prompt engineering, fine-tuning, and retrieval-augmented generation
- Deploy and operate models in production using MLOps practices including monitoring, drift detection, and reproducible pipelines
- Apply statistical and causal reasoning to measure model performance and business impact
- Design data pipelines that produce reliable, governed, AI-ready datasets
- Identify and mitigate adversarial, privacy, fairness, and safety risks in AI systems
- Communicate model behavior, limitations, and risk to technical and non-technical stakeholders
- Apply responsible AI and regulatory frameworks (NIST AI RMF and the EU AI Act) to engineering decisions

Curriculum Architecture

The program is structured in four phases that progressively build from foundational computing and mathematics to advanced AI specialization. Each phase culminates in a capstone lab conducted in the Rocheston AI Sphere.

CIP Code: 11.0102 - Artificial Intelligence

Degree Code: BSAIE-RCU-2026

Total Credits: 120 (42 General Education + 78 Major)

Duration: 4 Years / 8 Semesters (Full-Time)

Delivery: On-Campus with Hybrid Option (up to 40% Online)

RCAI Path: RCAI Level 1 (End of Year 2) + RCAI Level 2 (End of Year 4)

Accreditation: ABET-aligned computing curriculum (supports partner accreditation)

Year 1: Foundations of AI & Computing

The first year establishes the mathematical, programming, and data fundamentals that underpin all AI work. Students build their first models in the Rocheston AI Sphere within the first month of enrollment.

Fall Semester (Year 1)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 1010	Introduction to AI	3	None	2
AIE 1020	Python Programming for AI Engineers	4	None	4
AIE 1030	Mathematical Foundations	3	None	0
AIE 1040	Data Science Fundamentals	3	None	2
ENG 1010	Technical Writing & Communication	3	None	0

Spring Semester (Year 1)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 1050	Machine Learning Foundations	4	AIE 1010	4
AIE 1060	Applied Statistics for AI Engineers	3	AIE 1030	2
AIE 1070	Jupyter Notebooks for AI Experimentation	3	AIE 1020	2
AIE 1080	Visualization for AI and Data Science	3	AIE 1040	2
GEN 1020	Ethics & Society in the Age of AI	3	None	0

Year 1 AI Sphere Capstone: The First Model Challenge. Students ingest a messy real-world dataset, clean and profile it, train a baseline classifier, and submit a professional model report covering data quality, metrics, and limitations.

Year 2: Core Machine Learning & Deep Learning

The second year transforms students from programmers into model builders. Students train supervised, unsupervised, and deep models, and begin RCAI Level 1 certification preparation.

Fall Semester (Year 2)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 2010	Supervised Machine Learning	4	AIE 1050	4
AIE 2020	Unsupervised Machine Learning	3	AIE 1050	3
AIE 2030	Classification Algorithms and Evaluation	3	AIE 2010	2
AIE 2040	Evaluation Metrics for AI Systems	3	AIE 1060	2
AIE 2050	PyTorch Model Development	3	AIE 1020	3

Spring Semester (Year 2)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 2060	Deep Learning Foundations	4	AIE 2010	4
AIE 2070	Backpropagation and Neural Network Training	3	AIE 2060	3
AIE 2080	Neural Network Architectures	3	AIE 2060	3
AIE 2090	Forecasting and Time Series Modeling	3	AIE 1060	2
AIE 2100	Boosting, Bagging, and Ensemble Methods	3	AIE 2030	2

Year 2 AI Sphere Capstone: Model Gauntlet. A 48-hour challenge where student teams train, tune, and benchmark models across tabular, vision, and text tasks on a live leaderboard. Successful completion earns RCAI Level 1 certification eligibility.

Year 3: Generative AI, NLP & Vision Specialization

Year three is where students become applied AI engineers. The curriculum shifts to foundation models, large language models, computer vision, and retrieval systems. Two elective tracks allow specialization.

Fall Semester (Year 3)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 3010	Generative AI Foundations	4	AIE 2060	4
AIE 3020	Large Language Models (LLM)	4	AIE 3010	4
AIE 3030	Prompt Engineering	3	AIE 3010	3
AIE 3040	Computer Vision Foundations	3	AIE 2060	3
AIE 3E01	Elective I (See Elective Tracks)	3	Varies	Varies

Spring Semester (Year 3)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 3050	Retrieval-Augmented Generation	4	AIE 3020	4
AIE 3060	Natural Language Processing Foundations	3	AIE 3020	3
AIE 3070	Convolutional Neural Networks	3	AIE 3040	3
AIE 3080	Generative AI Application Engineering	3	AIE 3010	3
AIE 3E02	Elective II (See Elective Tracks)	3	Varies	Varies

Year 3 AI Sphere Capstone: Build a Generative AI Product. Students ship an end-to-end LLM application with retrieval, guardrails, evaluation, and a deployment, delivering a 40+ page engineering report with architecture, eval results, and a responsible AI assessment.

Elective Tracks (Choose One)

Track A: Generative AI & LLM Engineering

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 3E10	Foundation Models and Pretraining	3	AIE 3010	3
AIE 3E11	Parameter-Efficient Fine-Tuning	3	AIE 3020	3
AIE 3E12	Guardrails and Safety Controls for LLMs	3	AIE 3020	3
AIE 3E13	Mastering Agentic AI MCP Autonomous Systems	3	AIE 3E12	4

Track B: Computer Vision & Perception

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 3E20	Object Detection and Localization	3	AIE 3040	3
AIE 3E21	Segmentation for Computer Vision	3	AIE 3070	3
AIE 3E22	Vision Transformers	3	AIE 3070	3
AIE 3E23	Multimodal AI Systems	3	AIE 3E22	3

Track C: Data Science & Statistical Modeling

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 3E30	Bayesian Inference for Machine Learning	3	AIE 1060	3
AIE 3E31	Causal Inference for AI Decision Systems	3	AIE 1060	2
AIE 3E32	Feature Engineering and Feature Stores	3	AIE 2010	3
AIE 3E33	Tabular Machine Learning	3	AIE 2010	3

Year 4: Production AI, Governance & Capstone

The final year addresses production engineering, responsible AI, and emerging frontiers, culminating in a two-semester capstone. Students complete RCAI Level 2 preparation and compete in the national Rocheston AI Build Games.

Fall Semester (Year 4)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 4010	MLOps Engineering and Production Workflows	4	AIE 3080	4
AIE 4020	Model Deployment and Serving Patterns	3	AIE 4010	3
AIE 4030	Drift Detection and Model Monitoring	3	AIE 4010	3
AIE 4040	Responsible AI Engineering	3	AIE 2040	2
AIE 4900	Capstone I: Project Proposal, Research & Design	3	Senior Standing	2

Spring Semester (Year 4)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AIE 4050	Security for AI and ML Systems	3	AIE 4040	3
AIE 4060	Explainable AI and Interpretability	3	AIE 4040	2
AIE 4070	Edge AI and On-Device Inference	3	AIE 4020	3
AIE 4080	Professional Practicum: Industry Internship (400 hrs minimum)	3	Advisor Approval	20
AIE 4910	Capstone II: Implementation, Evaluation & Defense	4	AIE 4900	8

Year 4 Capstone: Ship-to-Production AI System. Students design, build, evaluate, deploy, and monitor a full AI system, then defend it before a panel of faculty and industry judges. Top performers receive the Rocheston AI Builder distinction on their RCAI Level 2 certification.

4. Bachelor of Science in Machine Learning & Data Science (B.S.MLDS)

Program Mission

While the B.S.AIE program focuses on AI systems engineering and generative applications, the B.S.MLDS program is designed for students pursuing careers in data science, analytics, quantitative modeling, and ML research. The curriculum emphasizes statistical rigor, experimentation, causal reasoning, and the translation of data into decisions.

Program Learning Outcomes

- Design and execute rigorous experiments and quasi-experiments to measure causal effects
- Build predictive and forecasting models with quantified uncertainty
- Engineer reproducible data pipelines and feature stores from raw, unstructured sources
- Apply Bayesian and probabilistic methods to real decision problems
- Communicate analytical findings to business and research stakeholders
- Evaluate fairness, bias, and validity threats in data-driven systems

Curriculum Architecture

Years 1-2: Shared Foundation

Years 1 and 2 share the same foundational curriculum as the B.S.AIE program (see Section 3), ensuring all students have identical core competencies in programming, mathematics, machine learning, and deep learning. The programs diverge in Year 3.

CIP Code: 30.7001 - Data Science, General

Degree Code: BSMLDS-RCU-2026

Total Credits: 120 (42 General Education + 78 Major)

Duration: 4 Years / 8 Semesters (Full-Time)

RCAI Path: RCAI Level 1 (End of Year 2) + RCAI Level 2 (End of Year 4)

Focus: Data Science, Statistical Modeling, Causal AI, Analytics

Year 3: Statistical Modeling & Data Engineering

Fall Semester (Year 3)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
MLD 3010	Regression Analysis for Machine Learning	4	AIE 1060	3
MLD 3020	Logistic Regression and Probabilistic Classification	3	AIE 1060	2
MLD 3030	Probabilistic Graphical Models	3	AIE 1060	3
MLD 3040	Data Engineering for AI Pipelines	3	AIE 1040	3
MLD 3E01	Elective I (See Data Science Electives)	3	Varies	Varies

Spring Semester (Year 3)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
MLD 3050	Causal Inference for AI Decision Systems	4	MLD 3020	3
MLD 3060	Dimensionality Reduction and Manifold Learning	3	MLD 3010	3
MLD 3070	Time Series Forecasting and Anomaly Detection	3	AIE 2090	3
MLD 3080	Anomaly Detection for Intelligent Systems	3	MLD 3030	3
MLD 3E02	Elective II (See Data Science Electives)	3	Varies	Varies

Data Science Electives

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
MLD 3E10	Uplift Modeling and Causal Targeting	3	MLD 3050	2
MLD 3E11	Uncertainty Quantification	3	MLD 3030	2
MLD 3E12	Predictive Analytics and Business Forecasting	3	AIE 2090	2
MLD 3E13	Fraud Detection and Risk Scoring with AI	3	MLD 3010	2

Year 4: Advanced Analytics & Capstone

Fall Semester (Year 4)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
MLD 4010	Bayesian Inference for Machine Learning	4	MLD 3030	3
MLD 4020	Statistical Learning Theory	3	MLD 3010	2
MLD 4030	Business Intelligence with AI Analytics	3	AIE 1080	3
MLD 4040	Data Governance for Machine Learning	3	AIE 4040	2
MLD 4900	Capstone I: Research Project Design	3	Senior Standing	2

Spring Semester (Year 4)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
MLD 4050	Quasi-Experimental Methods for AI Evaluation	3	MLD 3050	2
MLD 4060	What-If Analysis and Counterfactual Explanations	3	AIE 4060	2
MLD 4070	Professional Practicum: Industry Internship (400 hrs)	3	Advisor Approval	20
MLD 4910	Capstone II: Analysis Delivery & Defense	4	MLD 4900	8

Year 4 Capstone: End-to-End Data Science Engagement. Students take a stakeholder problem from raw data through modeling, causal analysis, and a board-ready recommendation, defended before faculty and industry judges.

5. Master of Science in Applied Artificial Intelligence (M.S.AAI)

Program Mission

The Master of Science in Applied Artificial Intelligence is designed for professionals seeking to become senior AI engineers and technical leaders. The program bridges hands-on model building with the architecture, governance, and strategy required to lead AI initiatives in the enterprise.

Program Learning Outcomes

- Architect production AI systems that align with business objectives and risk tolerance
- Lead the full AI lifecycle from data strategy through deployment, monitoring, and governance
- Evaluate and integrate generative AI, agentic systems, and foundation models
- Establish responsible AI programs aligned to NIST AI RMF and the EU AI Act
- Communicate AI capability, risk, and ROI to executives and boards

Curriculum Structure

Students complete 8 core courses, 2 track-specific courses, and either 2 electives or a thesis. Three tracks allow professionals to focus their expertise.

<p>CIP Code: 11.0102 - Artificial Intelligence</p> <p>Degree Code: MSAAI-RCU-2026</p> <p>Total Credits: 36 (12 Courses)</p> <p>Duration: 18 Months (Full-Time) / 24 Months (Part-Time)</p>	<p>Delivery: Online (Executive Format: Asynchronous + Monthly Intensives)</p> <p>Prerequisites: B.S. in STEM or 3+ Years Industry Experience + Programming Proficiency</p> <p>RCAI Path: RCAI Level 3 (upon completion)</p>
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Core Curriculum (24 Credits)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AAI 6010	Production ML System Design	3	Admission	3
AAI 6020	AI Deep Learning Essentials	3	Admission	3
AAI 6030	Large Language Model Foundations	3	Admission	3
AAI 6040	Retrieval-Augmented Generation	3	AAI 6030	3
AAI 6050	MLOps Engineering and Production Workflows	3	AAI 6010	3
AAI 6060	Governance, Risk, and Compliance for AI	3	Admission	0
AAI 6070	Causal Inference for AI Decision Systems	3	Admission	2
AAI 6080	Research Methods in Applied AI	3	Admission	0

Track A: AI Engineering Leadership (6 Credits)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AAI 7110	Cloud AI Architecture and Deployment	3	AAI 6010	3
AAI 7120	Scalable Machine Learning Architectures	3	AAI 6050	2

Track B: Generative & Agentic AI (6 Credits)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AAI 7210	Mastering Agentic AI MCP Autonomous Systems	3	AAI 6040	4
AAI 7220	Parameter-Efficient Fine-Tuning	3	AAI 6030	3

Track C: Responsible & Trustworthy AI (6 Credits)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AAI 7310	Model Risk Management for AI	3	AAI 6060	2
AAI 7320	Trustworthy AI and Assurance	3	AAI 6060	2

Elective Options (6 Credits) or Thesis

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
AAI 7E01	Diffusion Models and Image Generation	3	AAI 6020	3
AAI 7E02	Inference Optimization and Model Serving	3	AAI 6050	3
AAI 7E03	Explainable AI and Interpretability	3	AAI 6060	2
AAI 7E04	Synthetic Data Generation	3	AAI 6010	2
AAI 7E05	AI Product Strategy and Use Case Discovery	3	AAI 6060	0
AAI 9900	Master's Thesis in Applied AI (replaces 2 electives)	6	AAI 6080	0

6. Master of Science in Generative AI & Large Language Models (M.S.GAI)

Program Mission

This program addresses the fastest-growing specialization in the field: building, adapting, and operating generative and agentic AI systems. Graduates are among the first specialists capable of taking foundation models from pretraining concepts through fine-tuning, retrieval, evaluation, guardrails, and production deployment.

<p>CIP Code: 11.0102 - Artificial Intelligence (Generative AI Specialization)</p> <p>Degree Code: MSGAI-RCU-2026</p> <p>Total Credits: 36 (12 Courses)</p>	<p>Duration: 18 Months (Full-Time) / 24 Months (Part-Time)</p> <p>Delivery: Online with Monthly GPU Lab Intensives</p> <p>Prerequisites: B.S. in CS/Engineering/Math + Python & ML Proficiency</p> <p>RCAI Path: RCAI Level 3 with Generative AI Specialization</p>
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Core Curriculum (24 Credits)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
GAI 6010	Foundation Models and Pretraining	3	Admission	3
GAI 6020	Large Language Model Foundations	3	GAI 6010	3
GAI 6030	Pretraining Data Strategy	3	GAI 6010	3
GAI 6040	Parameter-Efficient Fine-Tuning	3	GAI 6020	3
GAI 6050	Retrieval-Augmented Generation	3	GAI 6020	3
GAI 6060	Guardrails and Safety Controls for LLMs	3	GAI 6020	3
GAI 6070	LLMOps and Lifecycle Management	3	GAI 6040	3
GAI 6080	Research Seminar in Generative AI	3	Admission	0

Advanced Electives (12 Credits - Choose 4)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
GAI 7010	Mastering Agentic AI MCP Autonomous Systems	3	GAI 6050	4
GAI 7020	Long-Context Modeling and Memory Systems	3	GAI 6020	3
GAI 7030	Query Optimization for Retrieval-Augmented Generation	3	GAI 6050	3
GAI 7040	Hallucination Detection and LLM Reliability	3	GAI 6020	2
GAI 7050	Diffusion Models and Image Generation	3	GAI 6010	3
GAI 7060	Multimodal AI Systems	3	GAI 6010	3
GAI 7070	Watermarking and AI Content Provenance	3	GAI 6060	2
GAI 7080	Synthetic Data Generation	3	GAI 6030	2
GAI 9900	Master's Thesis in Generative AI (replaces 2 electives)	6	GAI 6080	0

Capstone: Production LLM System. Students design and ship a complete generative AI system with fine-tuning, retrieval, evaluation harness, guardrails, observability, and a documented responsible AI assessment.

7. Master of Science in AI Engineering & MLOps (M.S.MLE)

Program Mission

This program produces the engineers who keep AI running in production. It focuses on the platforms, pipelines, serving infrastructure, monitoring, and reliability practices that turn models into dependable enterprise systems. Graduates lead ML platform teams and own the operational backbone of AI organizations.

<p>CIP Code: 11.0101 - Computer and Information Sciences (AI Engineering)</p> <p>Degree Code: MSMLE-RCU-2026</p> <p>Total Credits: 36 (12 Courses)</p>	<p>Duration: 18 Months (Full-Time) / 24 Months (Part-Time)</p> <p>Delivery: 100% Online with Cloud Lab Environments</p> <p>Prerequisites: B.S. in CS/Engineering + Programming Proficiency or 3+ Years Experience</p> <p>RCAI Path: RCAI Level 3 with AI Engineering Specialization</p>
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Core Curriculum (24 Credits)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
MLE 6010	Production ML System Design	3	Admission	3
MLE 6020	Model Deployment and Serving Patterns	3	MLE 6010	3
MLE 6030	Kubernetes for Machine Learning Platforms	3	MLE 6010	3
MLE 6040	Orchestration of ML Pipelines	3	MLE 6010	3
MLE 6050	Model Monitoring, Observability, and Alerting	3	MLE 6020	3
MLE 6060	Drift Detection and Model Monitoring	3	MLE 6050	3
MLE 6070	Inference Optimization and Model Serving	3	MLE 6020	3
MLE 6080	Experiment Tracking and Reproducible ML	3	Admission	2

Advanced Electives (12 Credits - Choose 4)

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
MLE 7010	Cloud AI Architecture and Deployment	3	MLE 6030	3
MLE 7020	Serving Infrastructure for ML Models	3	MLE 6020	3
MLE 7030	Job Scheduling for Distributed ML Training	3	MLE 6040	3
MLE 7040	ZeRO Optimization for Distributed Training	3	MLE 6030	3
MLE 7050	Versioning Data, Models, and Features	3	MLE 6080	2
MLE 7060	Testing AI Systems and Model Validation	3	MLE 6010	2
MLE 7070	XOps Practices for AI Platform Teams	3	MLE 6050	3
MLE 7080	GPU Acceleration for AI Workloads	3	MLE 6070	2
MLE 9900	Master's Thesis in AI Engineering (replaces 2 electives)	6	MLE 6080	0

Capstone: ML Platform Build. Students stand up a complete ML platform with CI/CD, automated training, serving, monitoring, and rollback, then run a reliability game-day exercise judged by industry engineers.

8. Graduate Diploma in Generative AI & LLM Engineering

Program Overview

A focused, accelerated credential for professionals who want deep technical expertise in generative and agentic AI without committing to a full master's degree. All 24 credits are transferable into the M.S.GAI program.

Credential Code: GDGAI-RCU-2026	Prerequisites: B.S. Degree or 2+ Years in IT/Software + Python
Total Credits: 24 (8 Courses)	RCAI Path: RCAI Level 2 with Generative AI Specialization
Duration: 12 Months	Stackable: Credits transfer into M.S.GAI
Delivery: Online with Bi-Monthly Virtual GPU Lab Intensives	

Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
GDG 5010	Generative AI Foundations	3	Admission	6
GDG 5020	Large Language Models (LLM)	3	GDG 5010	6
GDG 5030	Prompt Engineering	3	GDG 5010	6
GDG 5040	Retrieval-Augmented Generation	3	GDG 5020	6
GDG 5050	Parameter-Efficient Fine-Tuning	3	GDG 5020	6
GDG 5060	Guardrails and Safety Controls for LLMs	3	GDG 5020	6
GDG 5070	Mastering Agentic AI MCP Autonomous Systems	3	GDG 5040	6
GDG 5080	Generative AI Capstone: Full-Stack LLM Application	3	All Above	12

The GDG 5080 capstone is a 4-week, full-time build conducted in the Rocheston AI Sphere. Students ship a production-grade LLM application with retrieval, agentic workflows, evaluation, and guardrails, delivering a complete engineering report and live demo.

9. Graduate Diploma in Responsible AI, Governance & Safety

Program Overview

Designed for professionals moving into AI governance, risk, compliance, or safety roles, this diploma provides the strategic and regulatory knowledge required for AI assurance careers. It covers every major AI governance framework, bias-auditing methodology, and risk structure used in regulated enterprises and public-sector AI offices.

<p>Credential Code: GDRAI-RCU-2026</p> <p>Total Credits: 24 (8 Courses)</p> <p>Duration: 12 Months</p> <p>Delivery: 100% Online (Asynchronous with Weekly Live Sessions)</p>	<p>Prerequisites: B.S. Degree or 3+ Years Professional Experience</p> <p>RCAI Path: RCAI Level 2 with Governance Specialization</p> <p>Stackable: Credits transfer into M.S.AAI (Track C)</p>
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Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
GDR 5010	AI Governance and Lifecycle Management	3	Admission	0
GDR 5020	Governance, Risk, and Compliance for AI	3	GDR 5010	0
GDR 5030	Ethics and Regulations in AI	3	GDR 5010	0
GDR 5040	Fairness Metrics and Bias Auditing	3	GDR 5010	2
GDR 5050	Explainable AI and Interpretability	3	GDR 5010	2
GDR 5060	Model Risk Management for AI	3	GDR 5020	2
GDR 5070	XAI Auditing and Regulatory Reporting	3	GDR 5050	2
GDR 5080	Governance Capstone: Enterprise AI Assurance Program Design	3	All Above	4

10. Graduate Diploma in Computer Vision & Perception Systems

Program Overview

A specialized credential for engineers building perception systems for images, video, and the physical world. Covers detection, segmentation, transformers, multimodal models, and applied vision across healthcare, geospatial, and industrial domains.

<p>Credential Code: GDCV-RCU-2026</p> <p>Total Credits: 24 (8 Courses)</p> <p>Duration: 12 Months</p> <p>Delivery: Online with GPU-Powered Vision Labs</p>	<p>Prerequisites: Python Proficiency + ML Foundations</p> <p>RCAI Path: RCAI Level 2 with Computer Vision Specialization</p> <p>Stackable: Credits transfer into M.S.AAI</p>
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Code	Course Title	Cr.	Prerequisites	Lab Hrs/Wk
GDV 5010	Computer Vision Foundations	3	Admission	4
GDV 5020	Convolutional Neural Networks	3	GDV 5010	4
GDV 5030	Object Detection and Localization	3	GDV 5020	4
GDV 5040	Segmentation for Computer Vision	3	GDV 5020	4
GDV 5050	Vision Transformers	3	GDV 5020	4
GDV 5060	Multimodal AI Systems	3	GDV 5050	4
GDV 5070	Video Analytics and Action Recognition	3	GDV 5030	4
GDV 5080	Vision Capstone: End-to-End Perception System	3	All Above	10

11. Professional Certificate Catalog

The professional certificate tier gives partner universities a deep menu of short, intensive, job-focused credentials. Every certificate is fully hands-on, stackable into the graduate diplomas and master's degrees, and mapped to the RCAI certification ladder. Universities may offer any subset, rename them, or bundle several into a custom pathway. Nine certificate tracks are documented below.

Certificate 1: AI Foundations

Code: PCAF-RCU-2026 · 16 Weeks · Bootcamp · No prerequisites · RCAI Level 1 Prep

The zero-to-hero accelerator. Takes individuals with no prior AI experience and turns them into employable AI practitioners. No theory without a corresponding hands-on lab.

Module Code	Module Title	Hours
PCAF-M01	Welcome to RCAI Class	8
PCAF-M02	Introduction to AI	30
PCAF-M03	Python Programming for AI Engineers	40
PCAF-M04	Data Science Fundamentals	40
PCAF-M05	Machine Learning Foundations	40
PCAF-M06	Classification Algorithms and Evaluation	30
PCAF-M07	Clustering Methods and Unsupervised Discovery	30
PCAF-M08	Evaluation Metrics for AI Systems	20
PCAF-M09	Generative AI Foundations	30
PCAF-M10	Prompt Engineering	30
PCAF-M11	Visualization for AI and Data Science	20
PCAF-M12	Career Prep: Portfolio, Mock Interviews & RCAI Exam Prep	30

Certificate 2: Generative AI & Prompt Engineering

Code: PCGA-RCU-2026 · 12 Weeks · Online · RCAI Level 2 Prep

Module Code	Module Title	Hours
PCGA-M01	Generative AI Foundations	20
PCGA-M02	Large Language Models (LLM)	30
PCGA-M03	Prompt Engineering	30
PCGA-M04	Prompt Engineering for Generative AI	20
PCGA-M05	Retrieval-Augmented Generation	30
PCGA-M06	Guardrails and Safety Controls for LLMs	20
PCGA-M07	Hallucination Detection and LLM Reliability	20
PCGA-M08	Mastering Agentic AI MCP Autonomous Systems	30
PCGA-M09	Generative AI Application Engineering	20
PCGA-M10	Capstone: Build & Evaluate a Generative AI Application	30

Certificate 3: MLOps & Production AI Engineering

Code: PCML-RCU-2026 · 14 Weeks · Online · RCAI Level 2 Prep

Module Code	Module Title	Hours
PCML-M01	MLOps Engineering and Production Workflows	30
PCML-M02	Model Deployment and Serving Patterns	30
PCML-M03	Orchestration of ML Pipelines	30
PCML-M04	Kubernetes for Machine Learning Platforms	30
PCML-M05	Model Monitoring, Observability, and Alerting	30
PCML-M06	Drift Detection and Model Monitoring	20
PCML-M07	Inference Optimization and Model Serving	20
PCML-M08	Experiment Tracking and Reproducible ML	20
PCML-M09	Cloud AI Architecture and Deployment	20
PCML-M10	Capstone: Deploy & Monitor a Production Model	30

Certificate 4: Computer Vision Engineering

Code: PCCV-RCU-2026 · 12 Weeks · Online with GPU Labs · RCAI Level 2 Prep

Module Code	Module Title	Hours
PCCV-M01	Computer Vision Foundations	20
PCCV-M02	Image Classification and Visual Recognition	20
PCCV-M03	Convolutional Neural Networks	30
PCCV-M04	Object Detection and Localization	30
PCCV-M05	Segmentation for Computer Vision	30
PCCV-M06	Vision Transformers	20
PCCV-M07	YOLO Object Detection Engineering	20
PCCV-M08	Video Analytics and Action Recognition	20
PCCV-M09	Optical Character Recognition	20
PCCV-M10	Capstone: Real-Time Perception System	30

Certificate 5: NLP & Retrieval-Augmented Generation

Code: PCNL-RCU-2026 · 12 Weeks · Online · RCAI Level 2 Prep

Module Code	Module Title	Hours
PCNL-M01	Natural Language Processing Foundations	20
PCNL-M02	Tokenization and Text Preprocessing	20
PCNL-M03	Word Embeddings and Distributional Semantics	20
PCNL-M04	BERT and Contextual Language Representations	30
PCNL-M05	Neural Search and Dense Retrieval	30
PCNL-M06	Semantic Search and Vector Databases	30
PCNL-M07	Question Answering Systems	20
PCNL-M08	Retrieval-Augmented Generation	30
PCNL-M09	Text Classification and Sentiment Analysis	20
PCNL-M10	Capstone: Knowledge-Grounded RAG Assistant	30

Certificate 6: Business AI & Product

Code: PCBA-RCU-2026 · 10 Weeks · Online · RCAI Level 1 Prep

Module Code	Module Title	Hours
PCBA-M01	Applications in AI	20
PCBA-M02	AI Product Strategy and Use Case Discovery	30
PCBA-M03	Business Intelligence with AI Analytics	30
PCBA-M04	Predictive Analytics and Business Forecasting	20
PCBA-M05	UX Design for AI Assistants	20
PCBA-M06	Judgment Automation and Decision Support Systems	20
PCBA-M07	Low-Code AI and Citizen Development	20
PCBA-M08	Workforce Transformation with AI	20
PCBA-M09	Capstone: AI Product Business Case & Prototype	30

Certificate 7: Edge AI & Embedded Intelligence

Code: PCED-RCU-2026 · 12 Weeks · Online / Hybrid · RCAI Level 2 Prep

Module Code	Module Title	Hours
PCED-M01	Edge AI and On-Device Inference	20
PCED-M02	TinyML and Microcontroller AI	30
PCED-M03	Hardware-Aware AI Model Design	20
PCED-M04	Model Compression and Efficient Inference	30
PCED-M05	Quantization and Low-Precision Inference	20
PCED-M06	Knowledge Distillation and Teacher-Student Models	20
PCED-M07	IoT Analytics and Embedded Intelligence	20
PCED-M08	Web AI and Browser-Based Inference	20
PCED-M09	Capstone: Deploy a Model to a Constrained Device	30

Certificate 8: AI Security & Privacy Engineering

Code: PCAS-RCU-2026 · 12 Weeks · Online · RCAI Level 2 Prep

Module Code	Module Title	Hours
PCAS-M01	Security for AI and ML Systems	30
PCAS-M02	Adversarial Machine Learning Fundamentals	30
PCAS-M03	AI in Cybersecurity	20
PCAS-M04	Privacy-Preserving Machine Learning	30
PCAS-M05	Federated Learning and Collaborative Intelligence	20
PCAS-M06	Zero Trust Architecture for AI Systems	30
PCAS-M07	Vulnerability Detection with AI	20
PCAS-M08	Watermarking and AI Content Provenance	20
PCAS-M09	Capstone: AI System Red-Team & Privacy Audit	30

Certificate 9: Data Engineering for AI

Code: PCDE-RCU-2026 · 12 Weeks · Online · RCAI Level 2 Prep

Module Code	Module Title	Hours
PCDE-M01	Data Science Fundamentals	20
PCDE-M02	Data Engineering for AI Pipelines	30
PCDE-M03	Big Data Technologies	30
PCDE-M04	Dataset Quality, Profiling, and Cleaning	20
PCDE-M05	Feature Engineering and Feature Stores	30
PCDE-M06	Data Labeling, Annotation, and Ground Truth Design	20
PCDE-M07	Unstructured Data Processing	20
PCDE-M08	Vector Databases and Similarity Search	20
PCDE-M09	Capstone: Build an AI-Ready Data Pipeline	30

Certificate Stacking & Pathway Map

Certificates are designed as modular, stackable building blocks. Learners can begin with a single certificate, accumulate several into a graduate diploma, and ultimately apply credits toward a master's degree.

Certificate	Stacks Into Diploma	Stacks Into Master's
AI Foundations	Any Graduate Diploma	M.S.AAI
Generative AI & Prompt Engineering	GD Generative AI & LLM Eng.	M.S.GAI
MLOps & Production AI Engineering	GD Generative AI & LLM Eng.	M.S.MLE
Computer Vision Engineering	GD Computer Vision & Perception	M.S.AAI
NLP & Retrieval-Augmented Generation	GD Generative AI & LLM Eng.	M.S.GAI
Business AI & Product	GD Responsible AI & Governance	M.S.AAI
Edge AI & Embedded Intelligence	GD Computer Vision & Perception	M.S.MLE
AI Security & Privacy Engineering	GD Responsible AI & Governance	M.S.AAI
Data Engineering for AI	GD Generative AI & LLM Eng.	M.S.MLE

This catalog draws on a library of 305 modular AI courses across 20 domains. The programs shown here are reference configurations; partner universities may compose additional certificates and electives from the same module library.

Selected Course Descriptions

AIE 1010 - Introduction to AI. A comprehensive survey of the AI landscape including the history of the field, core paradigms (symbolic, statistical, neural), modern foundation models, agentic systems, and career pathways. Students build their first simple models in the Rocheston AI Sphere and explore the ethical and societal context of AI.

AIE 1050 - Machine Learning Foundations. The bedrock course of the program. Students master supervised and unsupervised learning, the bias-variance tradeoff, train/validation/test discipline, cross-validation, and rigorous evaluation. Labs progress from linear models to tree ensembles on real datasets.

AIE 3020 - Large Language Models. A deep dive into transformer-based language models: architecture, tokenization, pretraining, inference, and adaptation. Students work hands-on with open-weight models, learning to prompt, fine-tune, and evaluate them while reasoning carefully about reliability and failure modes.

AIE 3050 - Retrieval-Augmented Generation. Students design RAG systems end to end: chunking, embeddings, vector search, reranking, context assembly, and grounded generation. The course emphasizes evaluation of faithfulness and the engineering of production retrieval pipelines.

AIE 4010 - MLOps Engineering and Production Workflows. The course that turns models into systems. Students build reproducible training pipelines, automated deployment, model registries, and monitoring. They operate a model through its full lifecycle including retraining triggers and rollback.

AIE 4050 - Security for AI and ML Systems. An advanced course on the security of AI: adversarial examples, model extraction and inversion, data poisoning, prompt injection, and defensive techniques. Students audit a live AI system as their final project, mapping findings to the OWASP Top 10 for LLM Applications.

AIE 4910 - Capstone II: Implementation, Evaluation & Defense. The culminating academic experience. Students implement the system designed in Capstone I, evaluate it rigorously, and present to a panel of faculty, industry professionals, and Rocheston engineers. Projects must demonstrate mastery of at least three AI domains and include a working prototype, comprehensive report, and 30-minute defense.

12. Rocheston AI CyberRange & GPU Lab Environments

Overview

The Rocheston AI Sphere is the engine that powers every program in this catalog. Unlike static notebooks or pre-recorded demonstrations, the AI Sphere provides hyper-realistic, continuously evolving environments for training, deploying, evaluating, and attacking AI systems. Every student, from first-semester freshmen to master's candidates, trains in the same platform used by enterprise AI teams.

Lab Environment Categories

1. GPU Training & Experimentation Clusters

- On-demand GPU notebook environments (single-GPU to multi-node) for training and fine-tuning
- Pre-configured PyTorch, JAX, TensorFlow, and Keras toolchains
- Experiment tracking, model registries, and reproducible pipeline templates
- Shared datasets and feature stores spanning tabular, text, vision, and audio

2. Generative & Agentic AI Sandboxes

- Open-weight foundation models for prompting, fine-tuning, and evaluation
- Retrieval-augmented generation stacks with vector databases
- AINA Engine: Rocheston's agentic orchestration platform for tool-using, multi-step agents
- Guardrail, evaluation, and red-team harnesses for LLM applications

3. Applied Domain Labs

- Computer Vision Lab: detection, segmentation, and multimodal pipelines
- NLP & Retrieval Lab: search, ranking, and knowledge-grounded systems
- Healthcare AI Lab: medical imaging and clinical decision support (de-identified data)
- Edge AI Lab: model compression and on-device deployment to microcontrollers
- Reinforcement Learning Lab: simulation environments for agents and robotics

4. AI Security & Assurance Ranges

- Adversarial ML range: evasion, poisoning, and extraction scenarios
- LLM red-team range: prompt injection, jailbreak, and data-exfiltration exercises
- Privacy lab: federated learning and differential privacy experiments
- Bias-auditing and explainability workbenches mapped to governance frameworks

Platform Features

- **Rapid Model Integration:** When a major model or technique is released, corresponding labs are rapidly updated, with new material targeted within 48 hours
- **Difficulty Scaling:** Labs automatically adjust difficulty based on student performance and progression
- **Rocheston Raven Gamification:** Coin rewards, leaderboards, achievement badges, and challenge bonuses
- **Real-Time Scoring:** Automated assessment of model performance and engineering practices with detailed feedback
- **Collaboration Mode:** Team-based exercises with role assignments across the AI lifecycle
- **Recording & Replay:** All lab sessions are recorded for review, grading, and portfolio building
- **AINA OS & Rose X OS:** Pre-configured operating environments tuned for AI workloads

Compute & Responsible Use

The AI Sphere meters compute per student and per cohort, giving partner institutions full visibility into GPU usage and cost. Responsible-use guardrails are built into every environment: generated content is watermarked where applicable, red-team exercises run in isolated sandboxes, and all sensitive datasets are de-identified before they reach students.

13. RCAI Certification Alignment & AI Career Job Roles

RCAI Certification Levels

RCAI Level 1: AI Practitioner

Validates foundational AI knowledge and hands-on skills. Aligned with the build-and-evaluate competencies expected of junior AI and data roles.

- Achieved through: B.S. Year 2 completion, Professional Certificate in AI Foundations
- Exam format: 120 multiple choice questions + 4-hour practical modeling lab
- Domains: AI Foundations, Python for AI, Machine Learning, Evaluation, Data Fundamentals, Generative AI Basics

RCAI Level 2: AI Engineer

Validates advanced technical skills in building and shipping AI systems. Aligned with the competencies expected of AI/ML engineers and applied scientists.

- Achieved through: B.S. Year 4 completion, Graduate Diplomas, Advanced Professional Certificates
- Exam format: 80 advanced questions + 8-hour practical build-and-deploy challenge
- Domains: Deep Learning, Generative AI & LLMs, MLOps, Computer Vision or NLP, AI Security, Responsible AI

RCAI Level 3: AI Architect

Validates strategic leadership and enterprise AI architecture capabilities. Aligned with the competencies expected of AI architects, ML platform leads, and heads of AI.

- Achieved through: M.S. degree completion
- Exam format: 60 scenario-based questions + 24-hour enterprise AI design challenge + written defense
- Domains: AI System Architecture, MLOps at Scale, Generative & Agentic AI, AI Governance, Risk & Assurance, Strategic Leadership

Framework Mapping

The RCAI competency model is aligned to widely recognized public AI frameworks, including the NIST AI Risk Management Framework and the risk tiers of the EU AI Act. Graduates can speak the language of both engineering and governance.

What Can I Do After Graduating? AI Career Job Roles for RCAI Holders

One of the most common questions students ask is: what job can I actually apply for after I graduate? Because the RCAI competency model is mapped to widely recognized AI engineering and governance frameworks, graduates are positioned to apply for the following roles across technology companies, enterprises, research labs, startups, and public-sector AI offices.

Salary figures below are estimated U.S. market ranges and vary by location, experience, employer, and economic conditions.

RCAI Level 1 Graduates (B.S. Year 2 / Certificate Completers)

AI / Data Analyst. You prepare data, build baseline models, evaluate results, and translate findings into decisions. This is the front-line applied role that forms the backbone of every data and AI team.

- Typical job titles: AI Analyst, Data Analyst, Junior Data Scientist, ML Analyst, Applied AI Associate
- Salary range: \$70,000 - \$100,000

AI Application Developer. You build applications on top of foundation models, integrating prompts, retrieval, and APIs into products. This role has exploded with the rise of generative AI.

- Typical job titles: AI Engineer (Applications), Generative AI Developer, LLM Application Engineer, Conversational AI Developer
- Salary range: \$90,000 - \$135,000

RCAI Level 2 Graduates (B.S. Completers / Diplomas / Advanced Certificates)

Machine Learning Engineer. You build, train, deploy, and operate models in production. You own data pipelines, training infrastructure, serving, and monitoring. This is one of the most in-demand roles in the industry.

- Typical job titles: Machine Learning Engineer, AI Engineer, MLOps Engineer, Applied Scientist, ML Platform Engineer
- Salary range: \$120,000 - \$200,000

Generative AI / LLM Engineer. You specialize in foundation models: fine-tuning, retrieval, agentic systems, evaluation, and guardrails. You take generative features from prototype to reliable production.

- Typical job titles: Generative AI Engineer, LLM Engineer, AI Research Engineer, Agent Engineer, Prompt & RAG Engineer
- Salary range: \$140,000 - \$230,000

Computer Vision Engineer. You build perception systems for images and video across domains from healthcare to industrial automation to geospatial analysis.

- Typical job titles: Computer Vision Engineer, Perception Engineer, Vision Research Engineer, Multimodal AI Engineer
- Salary range: \$130,000 - \$210,000

AI Security & Privacy Engineer. You secure AI systems against adversarial, privacy, and abuse threats, red-teaming models and building defenses. A fast-emerging specialization at the intersection of AI and security.

- Typical job titles: AI Security Engineer, ML Security Researcher, AI Red Team Engineer, Privacy ML Engineer
- Salary range: \$140,000 - \$220,000

RCAI Level 3 Graduates (Master's Completers)

AI Architect / ML Platform Lead. You design the AI architecture and platforms for an organization, setting standards for how models are built, served, monitored, and governed across teams.

- Typical job titles: AI Architect, Principal ML Engineer, ML Platform Lead, Head of AI Engineering, Staff Applied Scientist
- Salary range: \$180,000 - \$300,000+

AI Governance & Risk Director. You own responsible AI programs, model risk management, and regulatory compliance, ensuring AI is deployed safely and lawfully across the enterprise.

- Typical job titles: AI Governance Director, Responsible AI Lead, Model Risk Manager, Chief AI Officer (track)
- Salary range: \$160,000 - \$280,000+

Where Do RCAI Graduates Work? Target Employer Categories

The AI talent shortage spans every sector. RCAI graduates are positioned for roles across the following categories of employers:

AI Labs & Big Tech

- Frontier AI labs and research organizations building foundation models
- Major cloud and platform providers (AI/ML divisions)
- Large consumer and enterprise software companies embedding AI into products

Enterprise & Industry

- Financial services: trading, fraud detection, risk modeling, customer AI
- Healthcare & pharma: medical imaging, clinical decision support, drug discovery
- Retail & e-commerce: recommendation, forecasting, personalization
- Manufacturing & industrial: predictive maintenance, quality, optimization
- Automotive & robotics: perception, autonomy, control

Consulting, Startups & Public Sector

- AI consulting and systems-integration practices
- Venture-backed AI startups across the application and infrastructure stack
- Government AI offices, national research institutes, and public-sector AI assurance teams

Why an Industry-Aligned Credential Matters

AI hiring increasingly emphasizes demonstrated, hands-on capability over theory alone. Because RCAI is competency-based and portfolio-driven, every graduate walks out with both a credential and a body of shipped work mapped to recognized AI engineering and governance frameworks.

RCAI Domain-to-Framework Mapping

RCAI Domain	Mapped Frameworks & Standards	RCAI Level
Machine Learning & Deep Learning	NIST AI RMF (Map, Measure)	1-2
Generative AI & LLMs	OWASP Top 10 for LLM Apps, NIST GenAI Profile	2-3
MLOps & AI Engineering	NIST AI RMF (Manage), MLOps Best Practices	2-3
Responsible AI & Governance	EU AI Act, NIST AI RMF (Govern)	2-3
AI Security & Privacy	OWASP ML Top 10, MITRE ATLAS	2-3
Statistics & Causal AI	NIST AI RMF (Measure), Model Validation Standards	2
Computer Vision & NLP	NIST AI RMF (Measure), Domain Benchmarks	2
Edge AI & Embedded	Efficiency & Reliability Best Practices	2

Mappings are provided as a curriculum-design reference. Partner institutions are responsible for any formal accreditation or regulatory alignment they pursue for their own programs.

Continuing Education & Recertification

Because AI evolves continuously, RCAI credentials carry a recommended 2-year refresh cycle. Holders maintain currency through Rocheston AI Cybernotes updates, new module completions, and annual capstone challenges in the AI Sphere.

14. Faculty Qualifications & Staffing Model

Recommended Faculty Qualifications

Partner universities should staff AI programs with faculty who meet the following minimum qualifications. Rocheston provides faculty training and certification support to help institutions meet these standards.

Full-Time Faculty (Tenure-Track)

- Doctoral degree (Ph.D. or D.Sc.) in Artificial Intelligence, Computer Science, Statistics, or a closely related field
- Minimum 3 years of industry or applied-research experience in AI/ML
- At least one industry-recognized AI credential (RCAI or equivalent)
- Active research program with peer-reviewed publications
- AI Sphere proficiency certification (provided by Rocheston during onboarding)

Industry Practitioners (Adjunct Faculty)

- Master's degree minimum (exceptions for exceptional industry credentials)
- Minimum 5 years of hands-on AI/ML experience
- Currently employed in relevant roles (ML Engineer, Applied Scientist, AI Architect, etc.)
- RCAI Level 2 or higher certification
- Demonstrated teaching ability through guest lectures, training delivery, or mentorship

Recommended Faculty-to-Student Ratios

- Lecture courses: 1:30 maximum
- Lab courses: 1:15 maximum (critical for hands-on supervision)
- Capstone advising: 1:5 maximum
- Graduate thesis supervision: 1:3 maximum

Teaching Support

Every course ships with a complete instructor kit: lecture decks, lab notebooks, autograded assessments, rubrics, and an AI Tutor assistant that supports students between sessions. Rocheston's curriculum team provides annual refresh training as models and tools evolve.

15. Student Career Outcomes & Employer Partners

Target Career Pathways by Program

Program	Entry-Level Roles	Mid-Career Roles (3-5 Years)
B.S.AIE	AI Engineer, ML Engineer I, Gen AI Developer	Senior ML Engineer, AI Architect, Gen AI Lead
B.S.MLDS	Data Scientist, ML Analyst, Quant Analyst	Senior Data Scientist, Principal Analyst, DS Lead
M.S.AAI	Senior AI Engineer, Applied Scientist	AI Architect, Head of AI, Principal Scientist
M.S.GAI	Generative AI Engineer, LLM Engineer	Gen AI Lead, AI Research Engineer, Agent Lead
M.S.MLE	MLOps Engineer, ML Platform Engineer	ML Platform Lead, Principal Infra Engineer
GD Generative AI	Gen AI Developer, LLM App Engineer	Senior Gen AI Engineer, AI Product Lead
GD Responsible AI	AI Governance Analyst, Risk Analyst	AI Governance Director, Model Risk Manager
GD Computer Vision	Computer Vision Engineer, Perception Eng.	Senior CV Engineer, Perception Lead
Cert AI Foundations	AI Analyst, Junior Data Scientist	ML Engineer, Data Scientist

Salary Benchmarks (US Market, 2026)

Estimated U.S. market ranges based on publicly available industry compensation surveys. Actual compensation varies by location, experience, and employer.

- AI / Data Analyst: \$70,000 - \$100,000
- Machine Learning Engineer: \$120,000 - \$200,000
- Generative AI / LLM Engineer: \$140,000 - \$230,000
- Computer Vision Engineer: \$130,000 - \$210,000
- AI Security Engineer: \$140,000 - \$220,000
- AI Architect / ML Platform Lead: \$180,000 - \$300,000+
- Head of AI / Chief AI Officer (track): \$250,000 - \$500,000+

Target Employer Categories

- **AI Labs & Big Tech:** Frontier model labs, cloud AI divisions, large software companies
- **Financial Services:** Banks, exchanges, fintechs, insurers (fraud, risk, trading, customer AI)
- **Healthcare & Pharma:** Providers, payers, device makers, biotech (imaging, clinical AI, discovery)
- **Retail & Consumer:** E-commerce, media, and consumer platforms (recommendation, personalization)
- **Industrial & Automotive:** Manufacturing, energy, mobility, robotics (perception, optimization, autonomy)
- **Consulting & Advisory:** AI strategy and systems-integration practices
- **Public Sector & Research:** Government AI offices, national labs, universities, NGOs

Portfolio-First Outcomes

Every RCAI-aligned program is portfolio-first. Graduates leave with shipped artifacts: trained models, deployed applications, evaluation reports, and red-team or governance assessments. In a hiring market that increasingly tests for demonstrated capability, this body of work is often more decisive than the credential alone.

Career Services & Employer Network

Partner universities receive access to Rocheston career-services resources, an AI-focused hiring portal, mock-interview banks, and capstone showcase events.

16. Admissions, Tuition & Financial Aid Framework

Admissions Requirements by Program

Bachelor of Science Programs (B.S.AIE / B.S.MLDS)

- High school diploma or equivalent (GED)
- Minimum 3.0 GPA (2.8 with conditional admission and summer bridge program)
- SAT: 1100+ or ACT: 22+ (test-optional policy available)
- Personal statement (500 words): Why AI?
- Letter of recommendation from a STEM teacher, employer, or mentor
- No prior AI experience required

Master of Science Programs (M.S.AAI / M.S.GAI / M.S.MLE)

- Bachelor's degree in a STEM field from an accredited institution (3.0 GPA minimum)
- OR: Bachelor's degree in any field + 3 years of professional experience
- Python and ML proficiency (or equivalent coursework)
- Professional resume and statement of purpose (750 words)
- Two professional or academic references

Graduate Diplomas

- Bachelor's degree from an accredited institution OR 2+ years of professional IT/software experience
- Professional resume and statement of intent

Professional Certificates

- AI Foundations: No prerequisites (open enrollment)
- Advanced Certificates: AI Foundations or equivalent experience

Suggested Tuition Framework

Partner universities set their own tuition rates. The following are recommended ranges based on market analysis of comparable AI programs:

Program	Total Program Cost (Suggested)	Per Credit / Module
B.S.AIE / B.S.MLDS (In-State)	\$48,000 - \$72,000	\$400 - \$600/credit
B.S.AIE / B.S.MLDS (Out-of-State)	\$80,000 - \$120,000	\$667 - \$1,000/credit
M.S.AAI / M.S.GAI / M.S.MLE	\$36,000 - \$54,000	\$1,000 - \$1,500/credit
Graduate Diplomas	\$18,000 - \$28,000	\$750 - \$1,167/credit
Professional Certificates	\$6,000 - \$14,000	Per program

Financial Aid & Scholarships

- **Federal Financial Aid (FAFSA):** Available for B.S. and M.S. programs at accredited partner institutions
- **GI Bill / Military Benefits:** Programs eligible for VA educational benefits at approved institutions
- **Rocheston Merit Scholarships:** Up to \$10,000/year for B.S. students with exceptional AI Sphere challenge scores
- **Merit & Inclusion Scholarship:** \$5,000/year awarded on a combination of academic merit and demonstrated need
- **AI Access Scholarship:** \$5,000/year for students demonstrating financial need
- **Career Changer Grant:** \$3,000 toward Professional Certificate tuition for career switchers
- **Employer Tuition Reimbursement:** Many employers reimburse AI-upskilling programs
- **Income Share Agreements (ISA):** Select partner institutions offer ISAs for Professional Certificates

Application Deadlines

- Fall Semester: August 1st (Priority: March 15th)
- Spring Semester: December 15th (Priority: October 1st)
- Summer Sessions: April 15th
- Professional Certificates: Rolling admissions (cohorts start quarterly)
- Graduate Diplomas: Rolling admissions with monthly start dates

Important Disclaimer

SAMPLE DOCUMENT

This is a sample document intended to demonstrate the scope and depth of the Rocheston Artificial Intelligence Academic Framework (RAIF). The programs, course codes, credit structures, and institutional details presented herein are illustrative examples designed to showcase what a partner university can build using the RAIF platform.

ABOUT ROCHESTON AI UNIVERSITY (RCU)

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