

Professional Skills Framework

AI Automation & Workflow Specialist

Country: United States

Covered jobs: AI Automation & Workflow Specialist

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ANNEX I Summary presentation of the qualification framework

GENERAL PRESENTATION

Training title: Professional Certificate in AI Automation & Workflow Specialist

Certification type: Professional Certificate — Level 6 (EQF equivalent)

Training modalities:

The training combines theoretical courses, practical workshops, and real-world project implementations. Students engage in hands-on learning through simulation environments, industry case studies, and supervised internships in technology companies.

Purpose and objectives:

This certification prepares professionals to design, implement, and optimize AI-driven automation solutions across diverse business environments. Graduates develop expertise in robotic process automation, machine learning model deployment, and workflow optimization to enhance organizational efficiency. The program emphasizes practical application of artificial intelligence technologies, business process analysis, and stakeholder collaboration to drive digital transformation initiatives.

Professional context:

AI Automation & Workflow Specialists operate at the intersection of technology and business operations, transforming traditional processes through intelligent automation solutions.

Target audience and access conditions:

The program is designed for technology professionals, business analysts, and individuals seeking to specialize in AI-driven automation solutions. Candidates should demonstrate strong analytical thinking, technical aptitude, and interest in emerging technologies.

Prerequisites:

- Bachelor's degree in Computer Science, Engineering, Business, or related field
- Proficiency in Python programming and scripting, including familiarity with libraries such as Pandas for data manipulation and Requests for API management
- Professional experience in technology or business process roles (preferred)
- Strong analytical and problem-solving skills

Access pathways:

- Initial professional training
- Continuing professional development
- Career transition programs
- Prior learning recognition

TRAINING ORGANIZATION

Pedagogical approach:

The pedagogical approach emphasizes practical application and industry relevance through experiential learning methodologies.

- Project-based learning with real business automation challenges
- Industry partnership for authentic case studies and internships
- Competency-based assessment aligned with professional standards
- Collaborative learning environment fostering cross-functional teamwork

Learning methods:

- Interactive workshops and laboratory sessions
- Simulation environments for automation testing
- Industry mentorship and guest expert sessions
- Capstone project with business partner organizations
- Peer collaboration and knowledge sharing platforms

Training strengths:

- Comprehensive coverage of emerging AI automation technologies and methodologies
- Strong industry partnerships providing real-world application opportunities
- Expert faculty with extensive professional experience in automation implementation
- State-of-the-art technology infrastructure and simulation environments
- Career services support with high placement rates in technology sectors
- Continuous curriculum updates reflecting latest industry trends and best practices
- Integration with major cloud certification pathways including AWS Certified AI Practitioner, Microsoft Azure AI Engineer Associate, and Google IT Automation with Python

SUMMARY TABLE OF ACTIVITIES - SKILL BLOCKS - UNITS

Activities	Skill blocks	Units
Function 1: Business Process Analysis and Automation Strategy • Conduct Business Process Analysis for Automation Opportunities • Develop Automation Strategy and ROI Assessment • Foster Stakeholder Collaboration and Training	Block 1 - Business Process Analysis and Automation Strategy Development • Analyze business processes and workflows to identify automation opportunities and develop strategic implementation roadmaps for operational efficiency improvement • Facilitate stakeholder collaboration and provide comprehensive training on automation tools to ensure successful adoption and continuous improvement of automated systems	Unit U1 Business Process Analysis and Automation Strategy Development
Function 2: AI and Machine Learning Model Development • Develop Predictive and Analytical AI Models • Implement Generative AI and Advanced Analytics • Model Deployment and Performance Optimization	Block 2 - AI and Machine Learning Model Development and Deployment • Design and implement AI-driven predictive models for anomaly detection, quality control, and business forecasting to enhance decision-making capabilities • Develop and deploy generative AI solutions and advanced analytics systems for code automation, fraud detection, and product design to accelerate innovation processes • Architect and deploy AI-driven workflow designs with intelligent routing and decision trees to streamline business processes and improve operational throughput	Unit U2 AI and Machine Learning Model Development and Deployment
Function 3: Robotic Process Automation and Workflow Implementation • Implement RPA Solutions and Process Automation • Automate HR and Business Process Workflows • Implement Vendor and Research Automation	Block 3 - Robotic Process Automation and Workflow Implementation • Configure and implement robotic process automation solutions and testing frameworks to streamline repetitive tasks and ensure software quality assurance • Automate human resources, compliance, and contract management workflows to ensure regulatory adherence and operational efficiency • Design and implement vendor management and research automation systems to optimize procurement processes and data collection workflows	Unit U3 Robotic Process Automation and Workflow Implementation
Function 4: Customer Experience and Support Automation • Develop Customer Support and Communication Automation • Implement Marketing and CRM Automation	Block 4 - Customer Experience and Marketing Automation • Develop intelligent customer support systems including chatbots, virtual assistants, and voice-activated controls to enhance user experience and service delivery • Implement AI-powered marketing automation and CRM enhancement systems to personalize customer interactions and optimize sales processes	Unit U4 Customer Experience and Marketing Automation

Activities	Skill blocks	Units
Function 5: Supply Chain and Operations Optimization • Implement Supply Chain Forecasting and Optimization • Implement Blockchain and Manufacturing Automation • Optimize Resource Allocation and Energy Management	Block 5 - Supply Chain and Operations Optimization • Design and implement supply chain optimization systems with AI forecasting and inventory management to improve operational efficiency and cost reduction • Integrate blockchain technology and implement edge AI solutions for manufacturing and supply chain traceability to ensure transparency and real-time decision making • Optimize resource allocation, workforce scheduling, and energy management systems using AI algorithms to maximize operational efficiency and sustainability	Unit U5 Supply Chain and Operations Optimization
Function 6: Infrastructure and System Integration • Design Cloud and Data Infrastructure • Implement Hardware-Software Integration and IoT • Implement Security and Monitoring Systems	Block 6 - Infrastructure and System Integration • Design scalable cloud infrastructure and implement automated data pipeline ETL processes to support enterprise-level automation requirements • Configure hardware-software interfaces and integrate IoT devices into automation workflows to enable seamless connectivity and real-time data collection • Implement comprehensive security automation, document processing systems, and monitoring dashboards to ensure data protection and operational visibility	Unit U6 Infrastructure and System Integration

Summary table of functions and activities

Function 1: Business Process Analysis and Automation Strategy
Activity 1.1 Conduct Business Process Analysis for Automation Opportunities
Activity 1.2 Develop Automation Strategy and ROI Assessment
Activity 1.3 Foster Stakeholder Collaboration and Training
Function 2: AI and Machine Learning Model Development
Activity 2.1 Develop Predictive and Analytical AI Models
Activity 2.2 Implement Generative AI and Advanced Analytics
Activity 2.3 Model Deployment and Performance Optimization
Function 3: Robotic Process Automation and Workflow Implementation
Activity 3.1 Implement RPA Solutions and Process Automation
Activity 3.2 Automate HR and Business Process Workflows
Activity 3.3 Implement Vendor and Research Automation
Function 4: Customer Experience and Support Automation
Activity 4.1 Develop Customer Support and Communication Automation
Activity 4.2 Implement Marketing and CRM Automation
Function 5: Supply Chain and Operations Optimization
Activity 5.1 Implement Supply Chain Forecasting and Optimization
Activity 5.2 Implement Blockchain and Manufacturing Automation
Activity 5.3 Optimize Resource Allocation and Energy Management
Function 6: Infrastructure and System Integration
Activity 6.1 Design Cloud and Data Infrastructure
Activity 6.2 Implement Hardware-Software Integration and IoT
Activity 6.3 Implement Security and Monitoring Systems

These areas, broken down into activities that the professional performs independently or under supervision, may not all be exercised within the employing organization, especially in a first job.

ANNEX II Professional activities framework

Professional context and jobs

AI Automation & Workflow Specialists serve as strategic technology professionals who bridge the gap between business needs and technological solutions. They analyze organizational processes, identify automation opportunities, and implement intelligent systems that enhance operational efficiency and decision-making capabilities. These professionals work collaboratively with cross-functional teams to design and deploy AI-driven solutions that transform traditional workflows into streamlined, data-driven processes. The role encompasses both technical implementation and strategic consultation, requiring specialists to understand business requirements, evaluate technological feasibility, and ensure successful adoption of automation solutions. They maintain ongoing responsibility for monitoring system performance, optimizing automated workflows, and providing training and support to ensure sustainable transformation outcomes.

The graduate performs different functions:

- business process analysis and automation strategy ;
- ai and machine learning model development ;
- robotic process automation and workflow implementation ;
- customer experience and support automation ;
- supply chain and operations optimization ;
- infrastructure and system integration ;

Relevant jobs

Jobs for these professionals can be found in various public and private organizations, including:

- Technology consulting firms and system integrators ;
- Enterprise software companies and automation vendors ;
- Manufacturing and industrial automation companies ;
- Financial services and banking institutions ;
- Healthcare technology organizations and medical device companies ;
- Government agencies and public sector organizations ;
- Freelance consulting and independent contractor services ;

Job titles vary across sectors. Examples include:

- AI Automation & Workflow Specialist ;
- Robotic Process Automation Developer ;
- Business Process Automation Consultant ;
- Workflow Optimization Engineer ;
- AI Implementation Specialist ;
- Automation Solutions Architect ;
- Digital Transformation Analyst ;

Entry-Level Compensation Range

Entry-level AI Automation & Workflow Specialists typically earn between \$65,000 and \$80,000 annually, with the national average reaching approximately \$116,607. Senior specialists with several years of experience can earn upwards of \$165,000 annually. High-demand regions like Cupertino, California, and Berkeley, California, show even higher average salaries, sometimes exceeding the national average by 20%. Compensation varies based on geographic location, industry sector, organizational size, and the ability to

demonstrate direct cost savings or revenue growth through automation initiatives.

Career development (3 to 5 years)

Career advancement opportunities are extensive given the growing demand for automation expertise across industries.

- Senior Automation Architect and Technical Lead
- Digital Transformation Manager and Strategy Director
- AI Solution Consultant and Business Development Specialist
- Automation Center of Excellence Manager
- Chief Technology Officer focused on automation initiatives

Further studies

Graduates may pursue advanced certifications in specialized automation platforms, machine learning engineering, or business technology management. Master's degree programs in Information Systems, Data Science, or Business Administration provide pathways for executive leadership roles.

PROFESSIONAL ETHICS AND CONDUCT

Professional practice requires adherence to ethical standards ensuring responsible automation implementation and data stewardship.

- Transparency in automated decision-making processes and algorithmic accountability
- Privacy protection and responsible data handling in automated systems
- Equity and fairness in AI model development and deployment
- Professional competency maintenance through continuous learning and certification
- Stakeholder communication regarding automation impacts and change management
- Security and confidentiality of organizational and customer data
- Sustainable technology practices and environmental responsibility

Function 1: Business Process Analysis and Automation Strategy

Function 1: Business Process Analysis and Automation Strategy

Activity 1.1 Conduct Business Process Analysis for Automation Opportunities

- Map current business processes and identify inefficiencies
 - Document existing workflows and process flows
 - Identify bottlenecks and manual intervention points
 - Analyze process complexity and volume metrics
- Assess automation feasibility and potential impact
 - Evaluate processes for automation suitability
 - Calculate potential time and cost savings
 - Identify technical and organizational constraints

■ Means and resources

- Process mapping software (Visio, Lucidchart)
- Business process management tools
- Data analytics platforms
- Stakeholder interview templates

■ Expected results

- Comprehensive process documentation and maps
- Automation opportunity assessment reports
- Prioritized list of automation candidates
- Cost-benefit analysis for each identified opportunity

Function 1: Business Process Analysis and Automation Strategy

Activity 1.2 Develop Automation Strategy and ROI Assessment

- Create comprehensive automation roadmaps
 - Define automation objectives and success metrics
 - Prioritize automation initiatives based on impact
 - Develop implementation timelines and resource requirements
- Conduct detailed ROI assessments
 - Calculate implementation costs and ongoing expenses
 - Project financial benefits and efficiency gains
 - Perform risk analysis and mitigation planning

■ Means and resources

- Financial modeling tools
- Project management software
- ROI calculation frameworks
- Risk assessment methodologies

■ Expected results

- Strategic automation roadmap documents

- Detailed ROI analysis reports
- Implementation timeline and budget estimates
- Risk mitigation strategies and contingency plans

Function 1: Business Process Analysis and Automation Strategy

Activity 1.3 Foster Stakeholder Collaboration and Training

- Establish cross-functional collaboration platforms
 - Set up communication channels between departments
 - Facilitate automation planning workshops
 - Create governance structures for automation projects
- Train teams on automation tools and processes
 - Develop training curricula for automation tools
 - Conduct hands-on workshops and demonstrations
 - Monitor and optimize automated workflow performance

■ Means and resources

- Collaboration platforms (Slack, Microsoft Teams)
- Training management systems
- Workshop facilitation tools
- Performance monitoring dashboards

■ Expected results

- Established cross-team collaboration frameworks
- Trained workforce capable of using automation tools
- Optimized workflow performance metrics
- Ongoing monitoring and improvement processes

Function 2: AI and Machine Learning Model Development

Function 2: AI and Machine Learning Model Development

Activity 2.1 Develop Predictive and Analytical AI Models

- Create anomaly detection and predictive maintenance systems
 - Design machine learning models for pattern recognition
 - Implement predictive algorithms for equipment maintenance
 - Develop failure mode analysis capabilities
- Build forecasting and optimization models
 - Create sales forecasting models using historical data
 - Develop predictive quality control systems
 - Implement resource allocation optimization algorithms

■ Means and resources

- Python/R programming environments
- Machine learning frameworks (TensorFlow, PyTorch)
- Cloud ML platforms (AWS SageMaker, Azure ML)
- Statistical analysis tools

■ Expected results

- Deployed anomaly detection systems
- Functional predictive maintenance models
- Accurate forecasting algorithms
- Optimized resource allocation systems

Function 2: AI and Machine Learning Model Development

Activity 2.2 Implement Generative AI and Advanced Analytics

- Develop generative AI applications
 - Create code generation and automation tools
 - Implement AI-powered design generation systems
 - Build content creation and optimization tools
- Deploy fraud detection and security systems
 - Design transaction fraud detection algorithms
 - Implement behavioral analysis models
 - Create real-time threat detection systems

■ Means and resources

- Generative AI frameworks (GPT, DALL-E)
- Natural language processing tools
- Computer vision libraries
- Security analytics platforms

■ Expected results

- Functional generative AI applications
- Automated code generation tools
- Effective fraud detection systems

- Real-time security monitoring capabilities

Function 2: AI and Machine Learning Model Development

Activity 2.3 Model Deployment and Performance Optimization

- Deploy models in production environments
 - Configure model serving infrastructure
 - Implement model versioning and rollback capabilities
 - Set up automated model retraining pipelines
- Monitor and optimize model performance
 - Track model accuracy and drift metrics
 - Implement A/B testing for model improvements
 - Optimize model inference speed and resource usage

■ Means and resources

- MLOps platforms (MLflow, Kubeflow)
- Container orchestration tools (Kubernetes)
- Model monitoring solutions
- Performance testing frameworks

■ Expected results

- Production-ready AI model deployments
- Automated model lifecycle management
- Optimized model performance metrics
- Continuous model improvement processes

Function 3: Robotic Process Automation and Workflow Implementation

Function 3: Robotic Process Automation and Workflow Implementation

Activity 3.1 Implement RPA Solutions and Process Automation

- Deploy robotic process automation tools
 - Configure RPA bots for repetitive tasks
 - Implement business rule engines
 - Create automated data entry and processing workflows
- Automate deployment and testing processes
 - Build continuous integration/deployment pipelines
 - Create automated testing frameworks
 - Implement quality assurance automation

■ Means and resources

- RPA platforms (UiPath, Blue Prism, Automation Anywhere)
- CI/CD tools (Jenkins, GitLab CI)
- Test automation frameworks (Selenium, TestComplete)
- Process orchestration tools

■ Expected results

- Functional RPA bot deployments
- Automated software deployment pipelines
- Comprehensive testing automation frameworks
- Reduced manual intervention in routine processes

Function 3: Robotic Process Automation and Workflow Implementation

Activity 3.2 Automate HR and Business Process Workflows

- Implement recruitment and onboarding automation
 - Automate candidate screening and evaluation
 - Create digital onboarding workflows
 - Implement automated document processing
- Automate compliance and contract management
 - Create compliance monitoring and reporting systems
 - Implement automated contract review workflows
 - Build audit trail and documentation systems

■ Means and resources

- HR automation platforms
- Document processing tools (OCR, NLP)
- Workflow management systems
- Compliance monitoring software

■ Expected results

- Streamlined recruitment and onboarding processes

- Automated compliance monitoring systems
- Efficient contract review and approval workflows
- Comprehensive audit documentation

Function 3: Robotic Process Automation and Workflow Implementation

Activity 3.3 Implement Vendor and Research Automation

- Automate vendor management processes
 - Create vendor onboarding and evaluation workflows
 - Implement automated procurement processes
 - Build vendor performance monitoring systems
- Automate research and feedback processes
 - Create R&D; experiment tracking systems
 - Implement automated feedback collection
 - Build data analysis and reporting automation

■ Means and resources

- Vendor management systems
- Survey and feedback platforms
- Research data management tools
- Analytics and reporting platforms

■ Expected results

- Streamlined vendor management workflows
- Automated R&D; tracking and reporting
- Efficient feedback collection and analysis
- Improved vendor relationship management

Function 4: Customer Experience and Support Automation

Function 4: Customer Experience and Support Automation

Activity 4.1 Develop Customer Support and Communication Automation

- Implement intelligent chatbots and virtual assistants
 - Design conversational AI interfaces
 - Create natural language understanding capabilities
 - Implement voice-activated workflow controls
- Optimize customer support workflows
 - Automate ticket routing and prioritization
 - Create self-service knowledge bases
 - Implement automated response systems

■ Means and resources

- Chatbot development platforms
- Natural language processing APIs
- Voice recognition and synthesis tools
- Customer support platforms

■ Expected results

- Intelligent customer support chatbots
- Voice-activated workflow systems
- Optimized support ticket management
- Enhanced customer self-service capabilities

Function 4: Customer Experience and Support Automation

Activity 4.2 Implement Marketing and CRM Automation

- Create personalized marketing automation
 - Implement AI-driven campaign personalization
 - Create customer segmentation algorithms
 - Build automated content generation systems
- Enhance CRM systems with AI insights
 - Implement predictive customer analytics
 - Create automated lead scoring systems
 - Build customer journey optimization tools

■ Means and resources

- Marketing automation platforms
- CRM systems (Salesforce, HubSpot)
- Customer analytics tools
- Personalization engines

■ Expected results

- Personalized marketing campaign systems
- Enhanced CRM with AI-driven insights
- Automated lead generation and scoring

- Optimized customer journey workflows

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Function 5: Supply Chain and Operations Optimization

Function 5: Supply Chain and Operations Optimization

Activity 5.1 Implement Supply Chain Forecasting and Optimization

- Deploy AI for supply chain forecasting
 - Create demand prediction models
 - Implement inventory optimization algorithms
 - Build supply chain risk assessment systems
- Optimize logistics and route planning
 - Implement AI-powered route optimization
 - Create dynamic delivery scheduling systems
 - Build transportation cost optimization tools

■ Means and resources

- Supply chain management software
- Optimization algorithms and solvers
- Geographic information systems
- Logistics tracking platforms

■ Expected results

- Accurate demand forecasting systems
- Optimized inventory management processes
- Efficient logistics and routing solutions
- Reduced supply chain costs and risks

Function 5: Supply Chain and Operations Optimization

Activity 5.2 Implement Blockchain and Manufacturing Automation

- Integrate blockchain for supply chain traceability
 - Implement blockchain-based tracking systems
 - Create smart contracts for supply chain processes
 - Build transparency and audit capabilities
- Deploy edge AI for manufacturing decisions
 - Implement real-time manufacturing decision systems
 - Create edge computing architectures
 - Build quality control automation

■ Means and resources

- Blockchain development platforms
- Edge computing devices and software
- Manufacturing execution systems
- IoT sensors and connectivity solutions

■ Expected results

- Blockchain-enabled supply chain traceability
- Real-time manufacturing decision systems
- Enhanced product quality and safety

- Improved supply chain transparency

Function 5: Supply Chain and Operations Optimization

Activity 5.3 Optimize Resource Allocation and Energy Management

- Implement AI for resource allocation optimization
 - Create workforce scheduling optimization systems
 - Implement dynamic resource allocation algorithms
 - Build capacity planning and utilization tools
- Optimize energy consumption in facilities
 - Implement smart energy management systems
 - Create predictive maintenance for energy equipment
 - Build sustainability monitoring and reporting

■ Means and resources

- Resource planning software
- Energy management systems
- IoT sensors and smart meters
- Optimization modeling tools

■ Expected results

- Optimized workforce scheduling systems
- Reduced energy consumption and costs
- Improved resource utilization rates
- Enhanced sustainability metrics

Function 6: Infrastructure and System Integration

Function 6: Infrastructure and System Integration

Activity 6.1 Design Cloud and Data Infrastructure

- Design scalable cloud automation architectures
 - Create cloud-native automation platforms
 - Implement microservices architectures
 - Build auto-scaling and load balancing systems
- Implement data pipeline automation
 - Create ETL/ELT data processing workflows
 - Implement real-time data streaming
 - Build data quality and validation systems

■ Means and resources

- Cloud platforms (AWS, Azure, GCP)
- Data pipeline tools (Apache Airflow, Kafka)
- Containerization technologies (Docker, Kubernetes)
- Infrastructure as Code tools (Terraform, CloudFormation)

■ Expected results

- Scalable cloud automation infrastructure
- Reliable automated data pipelines
- High-availability system architectures
- Efficient data processing workflows

Function 6: Infrastructure and System Integration

Activity 6.2 Implement Hardware-Software Integration and IoT

- Configure hardware-software interfaces
 - Integrate automation systems with existing hardware
 - Create device communication protocols
 - Implement industrial control system interfaces
- Integrate IoT devices into automation workflows
 - Connect sensors and devices to automation platforms
 - Implement device management and monitoring
 - Create IoT data processing and analytics

■ Means and resources

- IoT development platforms
- Industrial communication protocols
- Hardware integration tools
- Device management systems

■ Expected results

- Seamless hardware-software integration
- Connected IoT device ecosystems
- Reliable device communication networks

- Real-time IoT data processing capabilities

Function 6: Infrastructure and System Integration

Activity 6.3 Implement Security and Monitoring Systems

- Implement security automation and monitoring
 - Create automated vulnerability scanning systems
 - Implement security incident response automation
 - Build compliance monitoring and reporting
- Create monitoring and analytics dashboards
 - Build custom workflow insight dashboards
 - Implement automated routing decision systems
 - Create performance monitoring and alerting

■ Means and resources

- Security scanning tools
- SIEM platforms
- Dashboard development tools
- Monitoring and alerting systems

■ Expected results

- Automated security vulnerability management
- Comprehensive workflow monitoring dashboards
- Intelligent routing and decision systems
- Proactive system health monitoring

Block 1 - Business Process Analysis and Automation Strategy Development

Pedagogical objective

Enable learners to systematically analyze business processes, develop comprehensive automation strategies, and facilitate organizational change through stakeholder collaboration and training initiatives.

Activities

Activity 1.1 Conduct Business Process Analysis for Automation Opportunities

Activity 1.2 Develop Automation Strategy and ROI Assessment

Activity 1.3 Foster Stakeholder Collaboration and Training

Skills

Skills	Indicators
C1 - Analyze business processes and workflows to identify automation opportunities and develop strategic implementation roadmaps for operational efficiency improvement	Complete process mapping documentation with identified automation potential and ROI calculations Strategic automation roadmap approved by stakeholders with defined timelines and resource requirements Gap analysis report documenting current state versus desired automated state
C15 - Facilitate stakeholder collaboration and provide comprehensive training on automation tools to ensure successful adoption and continuous improvement of automated systems	Cross-team collaboration platforms with 90% user adoption and active engagement metrics Training programs achieving 95% competency certification rates among participants System monitoring and optimization resulting in 20% performance improvement post-implementation

Associated knowledge

Business Process Analysis and Optimization

Process Mapping and Documentation Standards

- BPMN 2.0 notation and modeling conventions
- Value stream mapping principles and techniques
- Process flowchart creation and standardization
- Swimlane diagrams and cross-functional process representation

Business Process Improvement Methodologies

- Lean Six Sigma principles for process optimization
- Kaizen continuous improvement framework
- Process reengineering methodologies

- Root cause analysis techniques

ROI and Cost-Benefit Analysis Frameworks

- Total Cost of Ownership (TCO) calculation methods
- Return on Investment (ROI) measurement techniques
- Net Present Value (NPV) analysis for automation projects
- Payback period calculation and interpretation

Process Analysis and Measurement Techniques

Process Discovery and Documentation

- Stakeholder interview techniques for process mapping
- Time and motion study methodologies
- Process mining tools and techniques
- Gap analysis execution and reporting

Automation Opportunity Assessment

- Rule-based task identification methods
- Process complexity evaluation techniques
- Volume and frequency analysis for automation prioritization
- Risk assessment for automation implementation

Training Program Development and Delivery

- Adult learning principles application
- Training material creation for technical audiences
- Hands-on workshop facilitation techniques
- Knowledge transfer and documentation methods

Stakeholder Engagement and Communication

Cross-functional Team Leadership

- Active facilitation during cross-departmental meetings
- Conflict resolution when technical and business priorities differ
- Clear communication of technical concepts to non-technical stakeholders
- Consensus building for automation strategy decisions

Change Management Support

- Empathetic response to employee concerns about automation
- Patience during training sessions with varying technical skill levels
- Adaptability when modifying training approaches based on audience feedback
- Persistence in following up on training effectiveness and adoption

Behavioral skills

- Demonstrates analytical rigor when examining complex business workflows by systematically documenting process steps, identifying bottlenecks, and quantifying inefficiencies using structured methodologies
- Exhibits strategic thinking when developing automation roadmaps by considering organizational constraints, resource availability, and long-term business objectives while balancing technical feasibility with business value
- Shows collaborative leadership when facilitating cross-functional teams by actively listening to stakeholder concerns, mediating conflicting priorities, and building consensus around automation initiatives
- Maintains adaptability when training diverse audiences on automation tools by adjusting communication style, pacing, and technical depth based on audience expertise and learning preferences

Rationale

This block encompasses the foundational strategic capabilities required to initiate and drive automation transformations within organizations. The competencies are united by their focus on understanding current state operations and creating actionable plans for improvement through automation. These skills work together to produce strategic automation roadmaps, comprehensive process analysis reports, and organizational change management plans that serve as blueprints for all subsequent automation initiatives. The functional coherence stems from the consultative nature of these activities, where professionals must combine analytical expertise with interpersonal skills to guide organizations through digital transformation. The deliverables produced through this block include business process documentation, ROI assessments, automation strategy documents, and training programs that collectively enable informed decision-making about automation investments. Evaluation contexts include client presentations of process analysis findings, facilitation of cross-departmental automation planning sessions, delivery of executive briefings on automation strategy, and measurement of training program effectiveness in real organizational settings.

Position in the learning progression

Foundations — This block serves as the essential starting point of the certification program, typically introduced in the first semester as it establishes the strategic mindset and analytical foundation required for all subsequent technical learning. No specific technical prerequisites are required beyond basic business acumen and communication skills, making it accessible to learners from diverse professional backgrounds. Mastery of this block is absolutely critical for success in all other blocks, as the strategic thinking, stakeholder management, and process analysis skills developed here are applied throughout the technical implementation phases covered in blocks B2 through B6. The complexity level focuses on developing structured thinking and communication competencies rather than technical depth. Students engage with real business scenarios through case studies and simulated client interactions, preparing them for their first professional immersion experiences where they observe and document existing business processes. This foundational block ensures learners understand the business context and strategic value of automation before diving into technical implementation details.

Block 2 - AI and Machine Learning Model Development and Deployment

Pedagogical objective

Develop expertise in designing, implementing, and deploying AI and machine learning models for business applications, including predictive analytics, generative AI solutions, and intelligent workflow architectures.

Activities

Activity 2.1 Develop Predictive and Analytical AI Models

Activity 2.2 Implement Generative AI and Advanced Analytics

Activity 2.3 Model Deployment and Performance Optimization

Skills

Skills	Indicators
C2 - Design and implement AI-driven predictive models for anomaly detection, quality control, and business forecasting to enhance decision-making capabilities	Deployed AI models achieving minimum 85% accuracy in predictive analytics tasks Model performance metrics documented with validation results and continuous improvement plans Integration of predictive models into existing business workflows with measurable impact
C3 - Develop and deploy generative AI solutions and advanced analytics systems for code automation, fraud detection, and product design to accelerate innovation processes	Functional generative AI tools deployed with documented use cases and user adoption metrics Fraud detection system achieving less than 2% false positive rate while maintaining 95% detection accuracy Code automation tools reducing development time by minimum 30% with quality standards maintained
C16 - Architect and deploy AI-driven workflow designs with intelligent routing and decision trees to streamline business processes and improve operational throughput	Workflow architectures supporting 10,000+ daily transactions with sub-second processing times Decision tree routing achieving 95% accuracy in automated process direction Workflow optimization demonstrating 40% reduction in process completion times

Associated knowledge

Artificial Intelligence and Machine Learning Foundations

Machine Learning Algorithms and Models

- Supervised learning algorithms (regression, classification)
- Unsupervised learning techniques (clustering, dimensionality reduction)
- Deep learning architectures (neural networks, CNNs, RNNs)
- Ensemble methods and model combination techniques
- RESTful API design and implementation for system integration
- Webhook configuration and event-driven automation triggers

Predictive Analytics and Forecasting

- Time series analysis and forecasting methods
- Statistical modeling for business prediction
- Anomaly detection algorithms and techniques
- Quality control statistical process control (SPC)

Generative AI and Large Language Models

- Natural Language Processing (NLP) fundamentals
- Transformer architectures and attention mechanisms
- Generative AI models (GPT, BERT, T5)
- Prompt engineering and fine-tuning techniques

AI Model Development and Deployment

Model Development and Training

- Data preprocessing and feature engineering techniques
- Model training, validation, and testing procedures
- Hyperparameter tuning and optimization methods
- Cross-validation and model evaluation metrics

AI Model Deployment and MLOps

- Model versioning and lifecycle management
- Containerization and orchestration for AI models
- Continuous integration/continuous deployment (CI/CD) for ML
- Model monitoring and performance tracking

Generative AI Implementation

- Code generation and automated programming techniques
- Fraud detection system development and tuning
- Product design automation using generative models
- Custom AI model fine-tuning for specific use cases

AI Ethics and Quality Assurance

Responsible AI Development

- Ethical consideration of bias and fairness in model development
- Transparency in explaining AI decision-making processes to stakeholders
- Accountability for AI model performance and business impact
- Continuous learning and adaptation to emerging AI best practices

Quality and Performance Focus

- Meticulous attention to data quality and model accuracy
- Systematic approach to model testing and validation
- Proactive monitoring of model drift and performance degradation
- Collaborative spirit when working with data scientists and domain experts

Behavioral skills

- Demonstrates scientific rigor when developing machine learning models by following systematic experimentation protocols, documenting model assumptions, and validating results through appropriate statistical methods
- Shows intellectual curiosity when exploring emerging AI technologies by actively researching new algorithms, experimenting with cutting-edge tools, and adapting innovative solutions to business problems
- Exhibits ethical responsibility when designing AI systems by considering bias implications, privacy concerns, and societal impact while ensuring transparent and explainable model decisions

- Maintains precision and attention to detail when implementing complex algorithms by carefully testing edge cases, validating data quality, and ensuring robust error handling in production systems

Rationale

This block consolidates the core artificial intelligence and machine learning capabilities essential for creating intelligent automation solutions. The competencies share a common focus on developing, optimizing, and deploying AI models that can analyze patterns, make predictions, and generate content to enhance business processes. Together, these skills enable the creation of sophisticated AI-powered systems including predictive maintenance algorithms, fraud detection models, generative design tools, and intelligent workflow routing systems. The functional coherence emerges from the shared technical foundation of machine learning principles, data science methodologies, and AI system architecture that underpins all these applications. Key deliverables include trained machine learning models, AI system architectures, predictive analytics dashboards, generative AI applications, and intelligent routing algorithms that can be integrated into broader automation frameworks. Professional evaluation occurs through model performance assessments, AI system deployment projects, algorithm optimization challenges, and real-world business problem-solving scenarios where AI solutions must demonstrate measurable business value and technical robustness.

Position in the learning progression

Cœur de métier — This block represents the technical heart of the AI Automation specialist role and is typically introduced in the second semester after students have established foundational strategic thinking through block B1. Prerequisites include solid understanding of business process analysis and basic programming concepts, as students must be able to contextualize technical AI solutions within business frameworks. This block directly enables and supports the technical implementation blocks B3, B4, and B5, providing the AI and machine learning expertise that powers automation solutions across customer experience, supply chain, and infrastructure domains. The complexity level progresses from introductory machine learning concepts to advanced model deployment and optimization techniques, requiring substantial hands-on practice with real datasets and business scenarios. Professional immersion experiences during this phase focus on AI model development projects, allowing students to apply learned techniques in actual business environments while building portfolios of working AI solutions. Successful completion of this block is essential before advancing to specialized application areas, as it provides the technical AI foundation that distinguishes this certification from general automation or process improvement programs.

Block 3 - Robotic Process Automation and Workflow Implementation

Pedagogical objective

Master the design, configuration, and implementation of robotic process automation solutions and automated workflows across diverse business functions including HR, compliance, vendor management, and quality assurance.

Activities

Activity 3.1 Implement RPA Solutions and Process Automation

Activity 3.2 Automate HR and Business Process Workflows

Activity 3.3 Implement Vendor and Research Automation

Skills

Skills	Indicators
C4 - Configure and implement robotic process automation solutions and testing frameworks to streamline repetitive tasks and ensure software quality assurance	RPA bots deployed with 99% uptime and error handling mechanisms Automated testing frameworks covering minimum 80% of test scenarios with reduced manual intervention Process automation documentation including maintenance procedures and troubleshooting guides
C5 - Automate human resources, compliance, and contract management workflows to ensure regulatory adherence and operational efficiency	HR automation systems processing applications with 95% accuracy and reduced processing time Compliance workflows meeting 100% of regulatory requirements with audit trail documentation Contract review automation achieving 70% reduction in review time while maintaining legal accuracy
C6 - Design and implement vendor management and research automation systems to optimize procurement processes and data collection workflows	Vendor management system with automated scoring and performance tracking capabilities Research automation tools reducing data collection time by minimum 50% with improved accuracy Feedback collection systems with automated analysis and reporting dashboards

Associated knowledge

Robotic Process Automation Platforms and Technologies

RPA Platform Knowledge

- UiPath platform architecture and components
- Blue Prism development environment and best practices
- Automation Anywhere bot development lifecycle
- Microsoft Power Automate workflow creation and management
- UiPath platform architecture and bot development lifecycle
- No-code automation platforms including Zapier, Make.com, and n8n workflow assembly

Testing Framework Architecture

- Test automation frameworks (Selenium, TestComplete, Cypress)
- Continuous testing and DevOps integration
- Test data management and environment setup
- Performance testing and load testing principles

Workflow Management Systems

- Business Process Management (BPM) platforms
- Workflow orchestration tools and patterns
- Event-driven architecture for automation
- Process automation governance and compliance

RPA Development and Process Automation

Bot Development and Configuration

- RPA bot design and development best practices
- Screen scraping and data extraction techniques
- Exception handling and error recovery mechanisms
- Bot scheduling and queue management

HR and Business Process Automation

- Employee onboarding workflow automation
- Compliance document processing and approval workflows
- Contract management system integration and automation
- Audit trail creation and regulatory reporting automation

Vendor and Research Automation

- Vendor management portal integration
- Automated procurement and approval workflows
- Research data collection and analysis automation
- Feedback aggregation and sentiment analysis implementation

RPA Quality Assurance and Governance

Process Excellence and Attention to Detail

- Methodical approach to bot testing and quality assurance
- Thorough documentation of automation processes and dependencies
- Precision in configuring business rules and logic flows
- Systematic validation of automated process outcomes

Compliance and Risk Management Mindset

- Vigilance in ensuring regulatory compliance throughout automation
- Proactive identification and mitigation of automation risks
- Consistent adherence to organizational policies and procedures
- Transparent communication about automation limitations and dependencies

Behavioral skills

- Demonstrates systematic methodology when configuring RPA workflows by following structured implementation processes, documenting configuration decisions, and ensuring consistent quality across multiple automation projects
- Shows meticulous attention to process details when automating compliance workflows by identifying all regulatory requirements, ensuring complete audit trails, and implementing comprehensive error handling for sensitive operations
- Exhibits problem-solving persistence when troubleshooting complex automation failures by systematically investigating root causes, testing multiple solutions, and implementing robust preventive

measures

- Maintains user-centric focus when designing automated workflows by considering end-user experience, providing clear interfaces, and ensuring seamless integration with existing business practices

Rationale

This block encompasses the operational automation capabilities that directly transform day-to-day business activities through systematic process automation. The competencies are unified by their focus on implementing repeatable, reliable automation solutions that handle routine tasks, ensure regulatory compliance, and streamline vendor and research operations. These skills work synergistically to produce comprehensive automation frameworks that can handle complex multi-step business processes while maintaining audit trails and quality standards. The functional coherence stems from the shared emphasis on process reliability, systematic implementation, and integration with existing business systems that characterizes all RPA and workflow automation initiatives. Primary deliverables include configured RPA bots, automated testing frameworks, compliance workflow systems, vendor management automation tools, and process documentation that enables scalable automation deployment across organizational functions. Evaluation contexts encompass live RPA deployments, compliance audit scenarios, vendor onboarding automation demonstrations, and quality assurance testing environments where automation solutions must prove their reliability, accuracy, and business value under real operational conditions.

Position in the learning progression

Cœur de métier — This block is introduced in the second semester alongside block B2, as both represent core technical competencies of the AI Automation specialist role, though B3 focuses on process automation while B2 emphasizes AI model development. Prerequisites include completion of block B1 for strategic process understanding, plus basic technical skills in workflow design and business process modeling. This block works in conjunction with block B2 to enable the specialized application blocks B4, B5, and B6, providing the operational automation foundation that complements AI capabilities in creating comprehensive automation solutions. The complexity level begins with simple RPA configurations and progresses to complex multi-system workflow integration, requiring extensive hands-on practice with enterprise automation platforms and real business scenarios. Professional experiences during this phase involve implementing actual RPA solutions in organizational settings, allowing students to understand the operational challenges and change management requirements of automation deployment. Mastery of this block is essential for success in application-specific blocks, as virtually all customer experience, supply chain, and infrastructure automation solutions rely on the workflow implementation and process automation skills developed here.

Block 4 - Customer Experience and Marketing Automation

Pedagogical objective

Develop specialized expertise in creating intelligent customer-facing automation solutions including conversational AI systems, personalized marketing automation, and enhanced CRM integration to optimize customer experience and sales processes.

Activities

Activity 4.1 Develop Customer Support and Communication Automation

Activity 4.2 Implement Marketing and CRM Automation

Skills

Skills	Indicators
C7 - Develop intelligent customer support systems including chatbots, virtual assistants, and voice-activated controls to enhance user experience and service delivery	Customer support automation achieving 80% first-contact resolution rate Virtual assistants handling 70% of routine inquiries without human intervention Voice-activated systems with 95% speech recognition accuracy in operational environment
C8 - Implement AI-powered marketing automation and CRM enhancement systems to personalize customer interactions and optimize sales processes	Marketing automation campaigns achieving minimum 25% improvement in conversion rates CRM systems with AI insights providing actionable recommendations for sales teams Personalization engines delivering relevant content with 90% customer satisfaction scores

Associated knowledge

Customer Experience and Communication Technologies

Conversational AI and Chatbot Technologies

- Natural Language Understanding (NLU) and dialog management
- Chatbot platforms (Dialogflow, Microsoft Bot Framework, Amazon Lex)
- Voice recognition and speech synthesis technologies
- Multi-channel communication platform integration

Customer Relationship Management Systems

- CRM platform architecture (Salesforce, HubSpot, Microsoft Dynamics)
- Customer journey mapping and touchpoint analysis
- Lead scoring and customer segmentation methodologies
- Marketing automation platform capabilities and limitations

Digital Marketing and Personalization

- Marketing campaign optimization techniques
- A/B testing and multivariate testing methodologies
- Customer data platforms and unified customer profiles
- Personalization engines and recommendation systems

Customer Support and Marketing Automation Implementation

Intelligent Customer Support Development

- Chatbot conversation flow design and optimization
- Virtual assistant integration with knowledge bases
- Voice-activated control system configuration
- Escalation pathway design for complex customer issues

Marketing Automation and CRM Enhancement

- Marketing campaign personalization algorithm development
- CRM workflow automation and lead nurturing sequences
- Customer behavior tracking and analytics implementation
- Sales process automation and pipeline management

Customer Experience Optimization

- User experience (UX) design for automated customer interactions
- Customer satisfaction measurement and feedback loop creation
- Omnichannel experience consistency implementation
- Customer service metrics tracking and reporting

Customer Service Excellence and Relationship Management

Customer-Centric Approach

- Empathy when designing customer interaction flows and responses
- Customer-first mindset in prioritizing automation features
- Responsiveness to customer feedback and continuous improvement suggestions
- Patience in testing and refining customer-facing automation systems

Service Quality and Relationship Building

- Commitment to maintaining high-quality customer service standards
- Collaborative approach with customer service and marketing teams
- Adaptability in adjusting automation based on customer behavior patterns
- Professional communication when training staff on new customer-facing systems

Behavioral skills

- Demonstrates customer empathy when designing conversational AI systems by understanding user intent, anticipating customer needs, and creating natural interaction flows that enhance rather than frustrate the customer experience
- Shows creative thinking when developing personalized marketing automation by designing innovative customer journey maps, creating engaging content variations, and implementing dynamic personalization strategies
- Exhibits data-driven decision making when optimizing customer interactions by analyzing user behavior patterns, A/B testing different approaches, and continuously refining automation based on performance metrics
- Maintains professional communication standards when configuring customer-facing systems by ensuring consistent brand voice, appropriate tone, and culturally sensitive interactions across all automated touchpoints

Rationale

This block focuses on customer-facing automation applications that directly impact customer experience, sales conversion, and brand interaction quality. The competencies are connected by their shared emphasis on understanding customer behavior, creating engaging interactions, and optimizing customer journey touchpoints through intelligent automation. Together, these skills enable the development of comprehensive customer experience automation ecosystems that can handle support inquiries, personalize marketing

interactions, and enhance CRM workflows while maintaining high service quality standards. The functional coherence emerges from the customer-centric perspective that must inform all decisions in this domain, requiring both technical automation skills and deep understanding of customer psychology and journey mapping. Key deliverables include optimized chatbot systems, virtual assistant applications, personalized marketing automation campaigns, enhanced CRM workflows, and voice-activated customer service tools that measurably improve customer satisfaction and business conversion rates. Professional evaluation occurs through customer satisfaction surveys, conversion rate analysis, customer service metrics assessment, and real-world deployment scenarios where automation solutions must demonstrate their ability to enhance rather than replace human customer interaction quality.

Position in the learning progression

Spécialisation — This specialized block is typically introduced in the third semester, building upon the foundational strategic thinking from block B1, core AI capabilities from block B2, and operational automation skills from block B3. Prerequisites include demonstrated competency in conversational AI development, understanding of customer journey mapping, and experience with CRM systems integration. This block represents one of three possible specialization paths (alongside blocks B5 and B6), allowing students to focus their expertise on customer-facing applications while maintaining broader automation competencies. The complexity level assumes solid technical foundation and emphasizes advanced application of AI and automation technologies to customer experience challenges, requiring sophisticated understanding of user experience design and customer behavior analytics. Professional experiences during this phase involve real customer service automation projects, allowing students to observe the impact of their solutions on actual customer satisfaction and business metrics. Students typically choose this specialization based on career interests in customer experience, digital marketing, or customer service technology roles, though exposure to all specialization areas ensures comprehensive understanding of automation applications across business functions.

Block 5 - Supply Chain and Operations Optimization

Pedagogical objective

Specialize in developing comprehensive supply chain automation solutions including AI forecasting, blockchain integration, edge computing deployment, and resource optimization systems to enhance operational efficiency and sustainability.

Activities

Activity 5.1 Implement Supply Chain Forecasting and Optimization

Activity 5.2 Implement Blockchain and Manufacturing Automation

Activity 5.3 Optimize Resource Allocation and Energy Management

Skills

Skills	Indicators
C9 - Design and implement supply chain optimization systems with AI forecasting and inventory management to improve operational efficiency and cost reduction	Supply chain forecasting models achieving minimum 90% accuracy in demand prediction Inventory optimization reducing carrying costs by 20% while maintaining service levels Route optimization systems achieving 15% reduction in transportation costs
C10 - Integrate blockchain technology and implement edge AI solutions for manufacturing and supply chain traceability to ensure transparency and real-time decision making	Blockchain integration providing complete supply chain traceability with immutable records Edge AI systems processing real-time manufacturing data with sub-second response times Manufacturing decision systems reducing defect rates by minimum 30% through predictive analytics
C11 - Optimize resource allocation, workforce scheduling, and energy management systems using AI algorithms to maximize operational efficiency and sustainability	Resource allocation systems achieving 95% utilization rates with balanced workload distribution Workforce scheduling optimization reducing overtime costs by 25% while maintaining coverage Energy management systems achieving minimum 20% reduction in consumption with maintained performance

Associated knowledge

Supply Chain Management and Optimization Technologies

Supply Chain Analytics and Forecasting

- Demand forecasting algorithms and statistical methods
- Inventory optimization models and safety stock calculations
- Supply chain network optimization and distribution planning
- Vendor performance management and supplier risk assessment

Blockchain and Distributed Ledger Technologies

- Blockchain fundamentals and consensus mechanisms
- Smart contract development and deployment

- Supply chain traceability and provenance tracking
- Cryptocurrency and token economics in supply chains

Edge Computing and Manufacturing Technologies

- Industrial Internet of Things (IIoT) architectures
- Edge AI deployment in manufacturing environments
- Real-time decision-making systems and latency optimization
- Manufacturing execution systems (MES) integration

Operations and Resource Management Implementation

Supply Chain Automation and Logistics

- AI-powered route planning and optimization algorithms
- Inventory management system automation and integration
- Logistics coordination and multi-modal transportation optimization
- Supplier portal development and automated procurement processes

Manufacturing and Production Optimization

- Edge AI model deployment for real-time manufacturing decisions
- Blockchain integration for supply chain transparency and traceability
- Production scheduling optimization using AI algorithms
- Quality control automation and predictive maintenance integration

Resource and Energy Management

- Workforce scheduling optimization using AI and constraint programming
- Resource allocation algorithms and capacity planning
- Energy consumption monitoring and optimization systems
- Facility management automation and environmental control systems

Operational Excellence and Continuous Improvement

Systems Thinking and Optimization Mindset

- Holistic approach to supply chain optimization and interdependency analysis
- Data-driven decision making in resource allocation and scheduling
- Continuous improvement mindset for operational efficiency enhancement
- Analytical thinking when evaluating complex operational trade-offs

Innovation and Technology Integration

- Forward-thinking approach to emerging technology adoption
- Adaptability when integrating new technologies into existing operations
- Collaborative spirit when working with operations and supply chain teams
- Persistence in optimizing complex systems with multiple variables and constraints

Behavioral skills

- Demonstrates systems thinking when designing supply chain automation by understanding interconnected dependencies, anticipating ripple effects, and optimizing across the entire value chain rather than isolated processes
- Shows sustainability consciousness when implementing resource optimization by considering environmental impact, energy efficiency, and waste reduction while maintaining operational effectiveness and cost efficiency
- Exhibits operational resilience thinking when deploying edge AI systems by designing for equipment failures, network disruptions, and unexpected demand variations while maintaining consistent performance
- Maintains precision focus when integrating blockchain technology by ensuring data accuracy, transaction integrity, and complete traceability while managing complex multi-party supply chain relationships

Rationale

This block consolidates advanced automation capabilities specifically designed to optimize supply chain operations, manufacturing processes, and resource allocation across complex organizational networks. The competencies share a common focus on creating intelligent systems that can forecast demand, optimize inventory, manage supplier relationships, and ensure operational sustainability while maintaining transparency and traceability. These skills work together to produce integrated supply chain automation platforms that combine predictive analytics, blockchain traceability, edge computing capabilities, and intelligent resource management to create competitive operational advantages. The functional coherence stems from the shared emphasis on operational efficiency, supply chain visibility, and real-time decision-making that characterizes modern supply chain management challenges. Primary deliverables include AI forecasting models, blockchain-enabled supply chain networks, edge AI manufacturing systems, inventory optimization algorithms, workforce scheduling tools, and energy management solutions that provide measurable operational improvements and competitive advantages. Evaluation contexts include supply chain simulation environments, real manufacturing floor deployments, multi-partner blockchain network implementations, and sustainability impact assessments where automation solutions must demonstrate tangible business value and operational excellence.

Position in the learning progression

Spécialisation — This advanced specialization block is introduced in the third semester after students have mastered foundational strategic thinking (B1), core AI development capabilities (B2), and operational automation implementation (B3). Prerequisites include demonstrated competency in predictive modeling, understanding of supply chain principles, and experience with IoT device integration and blockchain fundamentals. This block represents one of three possible specialization paths, allowing students to focus their expertise on operations and manufacturing applications while maintaining comprehensive automation knowledge. The complexity level assumes strong technical foundation and emphasizes sophisticated integration of multiple advanced technologies including AI, blockchain, IoT, and edge computing to solve complex operational challenges. Professional experiences during this phase involve real supply chain optimization projects with manufacturing partners, providing exposure to actual operational constraints and the complex stakeholder dynamics of supply chain transformation. Students typically select this specialization based on career interests in operations management, supply chain technology, manufacturing automation, or logistics optimization roles, though comprehensive exposure ensures understanding of automation applications across all business domains.

Block 6 - Infrastructure and System Integration

Pedagogical objective

Develop expertise in designing scalable automation infrastructure including cloud architectures, IoT integration, security automation, and monitoring systems that support enterprise-wide automation initiatives.

Activities

Activity 6.1 Design Cloud and Data Infrastructure
Activity 6.2 Implement Hardware-Software Integration and IoT
Activity 6.3 Implement Security and Monitoring Systems

Skills

Skills	Indicators
C12 - Design scalable cloud infrastructure and implement automated data pipeline ETL processes to support enterprise-level automation requirements	Cloud architecture supporting 99.9% uptime with auto-scaling capabilities Data pipelines processing terabytes of data daily with error rates below 0.1% ETL processes meeting defined SLA requirements with comprehensive monitoring and alerting
C13 - Configure hardware-software interfaces and integrate IoT devices into automation workflows to enable seamless connectivity and real-time data collection	Hardware-software integration achieving 99% connectivity reliability with failover mechanisms IoT device integration supporting real-time data streaming with latency under 100ms Device management systems monitoring and maintaining 1000+ connected endpoints
C14 - Implement comprehensive security automation, document processing systems, and monitoring dashboards to ensure data protection and operational visibility	Security automation systems detecting and responding to threats within 5 minutes Document processing pipelines achieving 98% accuracy with automated classification and routing Monitoring dashboards providing real-time visibility with customizable alerts and reporting

Associated knowledge

Infrastructure Architecture and Systems Integration

Cloud Computing Architectures

- Cloud service models (IaaS, PaaS, SaaS) and deployment strategies
- Microservices architecture and containerization technologies
- Serverless computing and event-driven architectures
- Multi-cloud and hybrid cloud integration patterns

Data Pipeline and ETL Technologies

- Extract, Transform, Load (ETL) process design and implementation
- Big data processing frameworks (Apache Spark, Hadoop, Kafka)
- Data warehouse and data lake architecture principles

- Real-time streaming data processing and analytics

IoT and Hardware Integration

- Internet of Things (IoT) protocols and communication standards
- Sensor networks and device management platforms
- Hardware-software interface design and API development
- Industrial automation and SCADA system integration

Infrastructure Implementation and Security

Cloud Infrastructure and Data Pipeline Development

- Cloud infrastructure provisioning and configuration management
- Automated data pipeline creation and monitoring
- Scalability planning and performance optimization
- Data integration and API development for enterprise systems

IoT and Hardware-Software Integration

- IoT device configuration and network integration
- Hardware interface programming and protocol implementation
- Sensor data collection and processing workflows
- Industrial automation system integration and control logic

Security and Monitoring Systems

- Security vulnerability scanning and automated remediation
- Document processing pipeline development and optimization
- Monitoring dashboard creation and alert system configuration
- Decision tree implementation for automated routing and escalation

Infrastructure Reliability and Security Management

Technical Excellence and Reliability Focus

- Meticulous approach to infrastructure design and implementation
- Proactive monitoring and maintenance of automated systems
- Systematic approach to troubleshooting and problem resolution
- Commitment to high availability and system reliability standards

Security and Risk Management Mindset

- Security-first approach to system design and implementation
- Vigilance in identifying and addressing potential security vulnerabilities
- Responsible handling of sensitive data and system credentials
- Continuous learning and adaptation to emerging security threats and best practices

Behavioral skills

- Demonstrates architectural thinking when designing scalable cloud infrastructure by considering long-term growth, integration requirements, and performance optimization while balancing cost and functionality
- Shows security-first mindset when implementing automation systems by proactively identifying vulnerabilities, implementing defense-in-depth strategies, and ensuring compliance with security standards throughout the development lifecycle
- Exhibits integration expertise when connecting diverse systems by understanding API protocols, data formats, and communication standards while ensuring seamless interoperability across technology platforms
- Maintains operational excellence focus when implementing monitoring systems by creating comprehensive dashboards, establishing meaningful alerts, and ensuring proactive system management capabilities

Rationale

This block encompasses the technical infrastructure and system integration capabilities essential for supporting enterprise-scale automation implementations across diverse technology environments. The competencies are unified by their shared focus on creating robust, scalable, and secure technical foundations that enable automation solutions to operate reliably in complex organizational ecosystems. Together, these skills enable the design and implementation of comprehensive automation infrastructure including cloud platforms, data processing pipelines, IoT networks, security frameworks, and monitoring systems that support automation initiatives across all business domains. The functional coherence emerges from the systems integration perspective that must consider scalability, security, interoperability, and maintainability as fundamental requirements for successful automation deployment at enterprise scale. Key deliverables include scalable cloud architectures, integrated IoT networks, automated security monitoring systems, data processing pipelines, hardware-software interface configurations, and comprehensive monitoring dashboards that provide the technical foundation for reliable automation operations. Professional evaluation occurs through infrastructure deployment projects, security assessment scenarios, system integration challenges, and large-scale automation support contexts where infrastructure solutions must demonstrate their ability to support complex automation requirements while maintaining performance, security, and reliability standards.

Position in the learning progression

Spécialisation — This technical specialization block is introduced in the third semester, building upon strategic foundations (B1), core AI capabilities (B2), and automation implementation skills (B3) to focus on the infrastructure requirements of enterprise automation. Prerequisites include demonstrated competency in cloud technologies, understanding of network protocols, experience with cybersecurity principles, and familiarity with enterprise system architectures. This block represents the third specialized pathway (alongside customer experience B4 and supply chain B5), enabling students to focus on the technical infrastructure that supports automation initiatives across all business domains. The complexity level assumes strong technical background and emphasizes advanced system architecture, security implementation, and large-scale integration challenges that require sophisticated understanding of enterprise technology environments. Professional experiences during this phase involve infrastructure projects with enterprise partners, providing exposure to the technical complexity and operational requirements of supporting automation at organizational scale. Students typically choose this specialization based on career interests in system architecture, DevOps, infrastructure engineering, or technical platform management roles, though comprehensive exposure ensures understanding of how infrastructure decisions impact automation effectiveness across all business applications.

ANNEX IV Assessment framework

ANNEX IV a. Unit exemptions

Holder of Master's degree in Computer Science with AI specialization, exempted from taking unit U2.

Holder of certified RPA Developer certification from major vendor, exempted from taking unit U3.

Holder of AWS Certified Solutions Architect or equivalent cloud certification, exempted from taking unit U6.

NSICA

ANNEX IV b. Examination regulations

Assessments	Unit	Coeff.	Form	Duration
E1 Business Process Analysis and Automation Strategy Assessment	U1	3	Single written assessment	4h
E2 AI and Machine Learning Model Development and Deployment	U2	4	Single practical assessment	6h
E3 Robotic Process Automation and Workflow Implementation	U3	3	Single practical assessment	5h
E4 Customer Experience and Marketing Automation	U4	2	Single practical assessment	4h
E5 Supply Chain and Operations Optimization	U5	3	Single practical assessment	5h
E6 Infrastructure and System Integration	U6	3	Single practical assessment	6h

*Optional assessments: only points above the pass mark are taken into account.

ANNEX IV c. Examination definitions

E1 : Business Process Analysis and Automation Strategy Assessment

Assessment purposes

Evaluate the candidate's ability to analyze business processes for automation opportunities and develop strategic implementation roadmaps. Assess competencies in stakeholder collaboration and training program design for automation tools adoption.

Assessment content

Written assessment including business process analysis case study, automation strategy development, and return on investment assessment scenarios. Oral presentation of automation implementation roadmap with stakeholder collaboration plan.

Assessed skills

C1 - Analyze business processes and workflows to identify automation opportunities and develop strategic implementation roadmaps for operational efficiency improvement

C15 - Facilitate stakeholder collaboration and provide comprehensive training on automation tools to ensure successful adoption and continuous improvement of automated systems

Assessment criteria

- Accuracy and depth of business process analysis
- Quality and feasibility of automation strategy development
- Effectiveness of return on investment assessment methodology
- Quality of stakeholder collaboration and training approaches
- Clarity and professionalism of presentation and documentation

Assessment format

Continuing education : Single written assessment — Written case study followed by oral presentation

Apprenticeship : Continuous assessment — Workplace-based assessment of business process analysis and strategy development

Vae : Single oral assessment — Portfolio presentation and professional experience validation

E2 : AI and Machine Learning Model Development and Deployment

Assessment purposes

Assess the candidate's ability to design, develop, and deploy AI-driven predictive models and generative AI solutions. Evaluate competencies in machine learning implementation, advanced analytics, and intelligent workflow architecture design.

Assessment content

Practical assessment involving development of predictive models for anomaly detection and quality control, implementation of generative AI solutions, and creation of intelligent routing systems with decision trees.

Assessed skills

C2 - Design and implement AI-driven predictive models for anomaly detection, quality control, and business forecasting to enhance decision-making capabilities

C3 - Develop and deploy generative AI solutions and advanced analytics systems for code automation, fraud detection, and product design to accelerate innovation processes

C16 - Architect and deploy AI-driven workflow designs with intelligent routing and decision trees to streamline business processes and improve operational throughput

Assessment criteria

- Technical accuracy of AI model design and implementation
- Quality and effectiveness of predictive analytics solutions
- Innovation and appropriateness of generative AI applications
- Performance optimization of deployed models
- Architecture quality of intelligent workflow designs

Assessment format

Continuing education : Single practical assessment — Laboratory-based AI model development and deployment project

Apprenticeship : Continuous assessment — Progressive evaluation of AI model development projects in workplace context

Vae : Single practical assessment — Demonstration of AI model development skills with portfolio evidence

Specific rules

- Access to professional AI development tools and datasets required
- Minimum performance threshold of 75% accuracy for predictive models

E3 : Robotic Process Automation and Workflow Implementation

Assessment purposes

Evaluate the candidate's ability to configure and implement robotic process automation solutions, automate business workflows, and design vendor management systems. Assess competencies in RPA deployment, compliance automation, and process optimization.

Assessment content

Practical implementation of RPA solutions including software testing automation, human resources workflow automation, and vendor management system configuration. Assessment includes compliance workflow design and contract management automation.

Assessed skills

C4 - Configure and implement robotic process automation solutions and testing frameworks to streamline repetitive tasks and ensure software quality assurance

C5 - Automate human resources, compliance, and contract management workflows to ensure regulatory adherence and operational efficiency

C6 - Design and implement vendor management and research automation systems to optimize procurement processes and data collection workflows

Assessment criteria

- Technical proficiency in RPA tool configuration and deployment
- Effectiveness of automated testing frameworks implementation
- Quality of compliance and regulatory workflow automation
- Efficiency of vendor management and procurement automation
- Integration quality between automated systems and existing infrastructure

Assessment format

Continuing education : Single practical assessment — RPA platform configuration and workflow automation project

Apprenticeship : Continuous assessment — Workplace implementation of RPA solutions with progressive assessment

Vae : Single practical assessment — Portfolio-based demonstration of RPA implementation experience

Specific rules

- Access to licensed RPA development platforms required

E4 : Customer Experience and Marketing Automation

Assessment purposes

Assess the candidate's ability to develop intelligent customer support systems and implement AI-powered marketing automation. Evaluate competencies in chatbot optimization, virtual assistant development, and customer relationship management enhancement.

Assessment content

Development and optimization of customer support automation including chatbot implementation, voice-activated controls, and marketing campaign personalization systems. Assessment includes customer relationship management automation and user experience enhancement.

Assessed skills

C7 - Develop intelligent customer support systems including chatbots, virtual assistants, and voice-activated controls to enhance user experience and service delivery

C8 - Implement AI-powered marketing automation and CRM enhancement systems to personalize customer interactions and optimize sales processes

Assessment criteria

- Quality and effectiveness of customer support automation solutions
- User experience optimization in chatbot and virtual assistant design
- Accuracy and relevance of marketing automation personalization
- Integration quality with existing customer relationship management systems

- Measurable improvement in customer satisfaction and engagement metrics

Assessment format

Continuing education : Single practical assessment — Customer support automation system development and testing

Apprenticeship : Continuous assessment — Real customer environment implementation with performance metrics

Vae : Single oral assessment — Portfolio presentation of customer automation projects and results

E5 : Supply Chain and Operations Optimization

Assessment purposes

Evaluate the candidate's ability to implement supply chain optimization systems, integrate blockchain technology, and optimize resource allocation using AI algorithms. Assess competencies in forecasting, inventory management, and operational efficiency improvement.

Assessment content

Implementation of supply chain forecasting systems, blockchain integration for traceability, inventory optimization tools, and resource allocation algorithms. Assessment includes energy management automation and workforce scheduling optimization.

Assessed skills

C9 - Design and implement supply chain optimization systems with AI forecasting and inventory management to improve operational efficiency and cost reduction

C10 - Integrate blockchain technology and implement edge AI solutions for manufacturing and supply chain traceability to ensure transparency and real-time decision making

C11 - Optimize resource allocation, workforce scheduling, and energy management systems using AI algorithms to maximize operational efficiency and sustainability

Assessment criteria

- Accuracy and effectiveness of supply chain forecasting models
- Quality of blockchain integration for transparency and traceability
- Performance optimization in inventory management and resource allocation
- Energy efficiency improvements through automation implementation
- Measurable operational efficiency gains and cost reduction

Assessment format

Continuing education : Single practical assessment — Supply chain optimization system implementation project

Apprenticeship : Continuous assessment — Workplace-based supply chain optimization with measurable outcomes

Vae : Single practical assessment — Portfolio demonstration of supply chain optimization achievements

Specific rules

- Access to supply chain simulation environments or real operational data required

E6 : Infrastructure and System Integration

Assessment purposes

Assess the candidate's ability to design scalable cloud infrastructure, configure hardware-software interfaces, and implement comprehensive security automation. Evaluate competencies in data pipeline automation, Internet of Things integration, and monitoring system implementation.

Assessment content

Design and implementation of cloud automation architectures, Internet of Things device integration, automated data pipeline extract transform load processes, and security vulnerability scanning systems. Assessment includes monitoring dashboard creation and document processing automation.

Assessed skills

C12 - Design scalable cloud infrastructure and implement automated data pipeline ETL processes to support enterprise-level automation requirements

C13 - Configure hardware-software interfaces and integrate IoT devices into automation workflows to enable seamless connectivity and real-time data collection

C14 - Implement comprehensive security automation, document processing systems, and monitoring dashboards to ensure data protection and operational visibility

Assessment criteria

- Scalability and performance of cloud infrastructure design
- Quality of hardware-software interface configuration and Internet of Things integration
- Effectiveness of automated security systems and vulnerability detection
- Reliability and efficiency of data pipeline automation
- Comprehensiveness and usability of monitoring and dashboard systems

Assessment format

Continuing education : Single practical assessment — Cloud infrastructure design and system integration project

Apprenticeship : Continuous assessment — Progressive infrastructure implementation with security and monitoring components

Vae : Single practical assessment — Portfolio-based demonstration of infrastructure and integration projects

Specific rules

- Access to cloud development platforms and Internet of Things hardware required
- Security clearance verification may be required for certain assessment components