



# D4.2 Specific Curriculum



DATA ANALYST EQF 4/5



Co-funded by  
the European Union

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## Project information

The Artificial Intelligence Skills Alliance (ARISA) fast-tracks the upskilling and reskilling of employees, job seekers, business leaders, and policymakers into AI-related professions to open Europe to new business opportunities. It is a four-year transnational project funded under the EU's Erasmus+ programme. For more information, contact [info@aiskills.eu](mailto:info@aiskills.eu) | [aiskills.eu](https://aiskills.eu)

## Project Partners



## **List of abbreviations**

AI	Artificial Intelligence
ARISA	Artificial Intelligence Skills Alliance
EQF	European Qualification Framework
EU	European Union

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## 1. General Information

<b>Name</b>	Data Analyst
<b>EQF level</b>	EQF 4/5
<b>Goals</b>	The Data Analyst curriculum at EQF 4/5 provides participants with foundational skills in data analysis and business intelligence. It covers essential topics such as data mining, big data analytics, and the basics of machine learning and AI. Participants will learn to develop data pipelines, implement ETL processes, and use Python for data analysis tasks. The program emphasizes the ability to communicate data insights effectively, apply ethical practices in data handling, and leverage AI technologies to inform business decisions.
<b>Scope</b>	This course is aimed at people interested in exploring data-driven roles and who seek to gain practical experience early in their educational path, paving the way for future opportunities in data analytics and business intelligence.
<b>Entry requirements</b>	<p>General Entry requirements:</p> <ul style="list-style-type: none"> <li>• Basic Mathematical Knowledge</li> <li>• Foundational Computer Skills</li> <li>• Basic Problem-Solving Skills</li> </ul>
<b>Programme learning outcomes (PLOs)</b>	<p>1 - AI Technologies (EQF 5)</p> <p>2 - Big Data &amp; Data Analytics (EQF 5)</p> <p>3 - AI Ethics (EQF 5)</p> <p>4 - Business Intelligence (EQF 5)</p> <p>5 - AI Awareness (EQF 5)</p> <p>6 - Machine Learning (EQF 5)</p> <p>7 - Explainable AI (EQF 5)</p> <p>8 - Soft Skills (EQF 5)</p>

## 2. Description of the Structure

The course is structured into 11 modules for a total of 200 hours. It begins with an introduction to business intelligence and foundational AI concepts. The curriculum progresses to data mining and big data analysis, focusing on data warehousing and OLAP.

Further modules cover Python programming for data analysis, including libraries like NumPy and Pandas, and fundamentals of machine learning with a focus on clustering, classification, and regression in Python. The course addresses explainability in AI and concludes with ethical and legal considerations in data science.

## 3. Overview of Learning Units

Learning unit title	Hours/ECTS	EQF level	Assessment(s)
Introduction to Business Intelligence	15	EQF 5	Exam
ETL, Data Warehouses, OLAP	20	EQF 5	Exam
Introduction to Artificial Intelligence and its applications	10	EQF 5	Exam
Introduction to Data Mining	15	EQF 5	Exam
Fundamentals of Data Mining and Big Data Analysis	20	EQF 5	Exam
Python Basics	15	EQF 5	Practical Assignment
Programming for Data Mining (NumPy, Pandas, Matplotlib)	25	EQF 5	Practical Assignment
Fundamentals of Machine Learning	20	EQF 5	Exam
Clustering, Classification and Regression in Python	25	EQF 5	Practical Assignment
Explainability in Artificial Intelligence	15	EQF 5	Exam
Ethical and Legal issues in Data Science	10	EQF 5	Exam

## 4. Details of Learning Units

### 4.1. Introduction to Business Intelligence

#### Description

Covers the basics of business intelligence, including tools and techniques to transform data into actionable insights.

#### Related Programme Learning Outcome(s)

- 1 - Business Intelligence (EQF 5)
- 2 - AI Awareness (EQF 5)
- 3 - Soft Skills (EQF 5)

#### Unit learning outcomes

- Utilizes specialized knowledge in business intelligence systems
- Develops and implements analytical models and reports that transform raw data into actionable insights
- Evaluates the effectiveness of business intelligence strategies and tools
- Manages business intelligence projects
- Communicates complex data insights in a clear and understandable manner
- Leads the adoption of new business intelligence technologies and practices
- Evaluates real-world case studies where AI has been successfully implemented
- Solves problems creatively and efficiently
- Cultivates an innovative mindset

#### Delivery method(s)

- Case study analysis
- Workshop
- Lectures

#### Materials

##### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

##### Student readings suggested:

Berthold, M.R., Borgelt, C., Höppner, F., Klawonn, F. GUIDE TO INTELLIGENT DATA ANALYSIS. Springer Verlag, 1st Edition., 2010. ISBN 978-1-84882-259-7

## 4.2. ETL, Data Warehouses, OLAP

### Description

Introduces ETL processes, data warehousing concepts, and Online Analytical Processing (OLAP) for efficient data management.

### Related Programme Learning Outcome(s)

- 1 - Business Intelligence (EQF 5)
- 2 - AI Awareness (EQF 5)
- 3 - Soft Skills (EQF 5)

### Unit learning outcomes

- Utilizes specialized knowledge in business intelligence systems
- Develops and implements analytical models and reports that transform raw data into actionable insights
- Evaluates the effectiveness of business intelligence strategies and tools
- Manages business intelligence projects
- Communicates complex data insights in a clear and understandable manner
- Leads the adoption of new business intelligence technologies and practices
- Evaluates real-world case studies where AI has been successfully implemented
- Solves problems creatively and efficiently
- Cultivates an innovative mindset

### Delivery method(s)

- Workshop
- Lectures

### Materials

#### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

### 4.3. Introduction to Artificial Intelligence and Its Application

#### Description

Provides an overview of AI technologies and their practical applications in various domains.

#### Related Programme Learning Outcome(s)

- 1 - AI Awareness (EQF 5)
- 2 - Explainable AI (EQF 5)
- 3 - Soft Skills (EQF 5)

#### Unit learning outcomes

- Identifies and explains the key technologies and methodologies that underpin AI
- Analyses the potential impacts of AI on society
- Discusses the challenges and risks associated with AI deployment
- Evaluates real-world case studies where AI has been successfully implemented
- Communicates effectively about AI technologies and their implications
- Understands and explains the theoretical foundations of explainable AI
- Communicates effectively the principles and benefits of explainable AI to non-technical audiences
- Cultivates an innovative mindset

#### Delivery method(s)

- Workshop
- Lectures
- Case studies

#### Materials

##### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

#### 4.4. Introduction to Data Mining

##### Description

Introduces fundamental techniques in data mining, including methods for discovering patterns in large datasets.

##### Related Programme Learning Outcome(s)

- 1 – Big Data & Data Analytics (EQF 5)
- 2 - AI Awareness (EQF 5)

##### Unit learning outcomes

- Utilizes comprehensive, specialized knowledge of big data technologies and data analytics processes
- Identifies and explains the key technologies and methodologies that underpin AI

##### Delivery method(s)

- Workshop
- Lectures

##### Materials

###### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

###### Student readings suggested:

Pang-Ning Tan, Michael Steinbach, Vipin Kumar. Introduction to Data Mining. Addison Wesley, ISBN 0-321-32136-7, 2006

## 4.5. Fundamentals of Data Mining and Big Data Analysis

### Description

Expands on data mining with a focus on big data technologies and analysis techniques.

### Related Programme Learning Outcome(s)

- 1 - Big Data & Data Analytics (EQF 5)
- 2 - AI Ethics (EQF 5)
- 3 - AI Awareness (EQF 5)
- 4 - Soft Skills (EQF 5)

### Unit learning outcomes

- Utilizes comprehensive, specialized knowledge of big data technologies and data analytics processes
- Evaluates the effectiveness of data analytics strategies and tools in real-world applications
- Communicates findings from data analytics clearly to stakeholders
- Leads and manages teams in data-driven projects
- Evaluates AI systems for potential ethical issues and biases
- Identifies and explains the key technologies and methodologies that underpin AI
- Cultivates an innovative mindset

### Delivery method(s)

- Workshop
- Lectures
- Project work

### Materials

#### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

#### Student readings suggested:

Dasgupta, N. (2018). Practical big data analytics: Hands-on techniques to implement enterprise analytics and machine learning using Hadoop, Spark, NoSQL and R. Packt Publishing Ltd.

## 4.6. Python Basics

### Description

Covers basic Python programming skills essential for data analysis and manipulation.

### Related Programme Learning Outcome(s)

1 – Big Data & Data Analytics (EQF 5)

2 - Soft Skills (EQF 5)

### Unit learning outcomes

- Develops scalable data pipelines and architectures that ensure data integrity and accessibility
- Solves problems creatively and efficiently

### Delivery method(s)

- Workshop
- Lectures

### Materials

#### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

#### Student readings suggested:

Matthes, E. (2023). Python crash course: A hands-on, project-based introduction to programming.

#### 4.7. Programming for Data Mining (NumPy, Pandas, Matplotlib)

##### Description

Teaches data mining using Python libraries, focusing on data handling, analysis, and visualization.

##### Related Programme Learning Outcome(s)

- 1 – Big Data & Data Analytics (EQF 5)
- 2 - Machine Learning (EQF 5)
- 3 - Soft Skills (EQF 5)

##### Unit learning outcomes

- Analyses complex data using statistical models and machine learning techniques
- Develops scalable data pipelines and architectures that ensure data integrity and accessibility
- Evaluates the effectiveness of data analytics strategies and tools in real-world applications
- Applies comprehensive and specialized knowledge in machine learning techniques
- Solves problems creatively and efficiently
- Manages conflicts by implementing effective resolution strategies

##### Delivery method(s)

- Workshop
- Lectures

##### Materials

###### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

###### Student readings suggested:

McKinney, W. (2022). Python for data analysis. " O'Reilly Media, Inc."

## 4.8. Fundamentals of Machine Learning

### Description

Introduces key concepts and techniques in machine learning, including algorithms for data classification and prediction.

### Related Programme Learning Outcome(s)

- 1 - AI Technologies (EQF 5)
- 2 – Big Data & Data Analytics (EQF 5)
- 3 – AI Awareness (EQF 5)
- 4 - Machine Learning (EQF 5)

### Unit learning outcomes

- Designs and optimizes AI models to solve specific problems
- Analyses complex data using statistical models and machine learning techniques
- Evaluates the effectiveness of data analytics strategies and tools in real-world applications
- Communicates findings from data analytics clearly to stakeholders
- Leads and manages teams in data-driven projects
- Identifies and explains the key technologies and methodologies that underpin AI
- Applies comprehensive and specialized knowledge in machine learning techniques
- Designs and evaluates machine learning models to optimize performance
- Implements advanced data pre-processing, feature engineering, and algorithm tuning techniques
- Communicates complex machine learning concepts and results
- Stays abreast of emerging trends and technologies in machine learning

### Delivery method(s)

- Workshop
- Lectures

### Materials

#### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

#### Student readings suggested:

Burkov, A. (2019). The hundred-page machine learning book (Vol. 1, p. 32). Quebec City, QC, Canada: Andriy Burkov.

## 4.9. Clustering, Classification and Regression in Python

### Description

Covers practical implementation of clustering, classification, and regression techniques using Python.

### Related Programme Learning Outcome(s)

- 1 – Big Data & Data Analytics (EQF 5)
- 2 – AI Awareness (EQF 5)
- 3 - Machine Learning (EQF 5)
- 4 - Soft Skills (EQF 5)

### Unit learning outcomes

- Designs and optimizes AI models to solve specific problems
- Analyses complex data using statistical models and machine learning techniques
- Identifies and explains the key technologies and methodologies that underpin AI
- Applies comprehensive and specialized knowledge in machine learning techniques
- Designs and evaluates machine learning models to optimize performance
- Manages and leads machine learning projects
- Implements advanced data pre-processing, feature engineering, and algorithm tuning techniques
- Solves problems creatively and efficiently
- Manages conflicts by implementing effective resolution strategies

### Delivery method(s)

- Workshop
- Lectures
- Project Work

### Materials

#### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

## 4.10. Explainability in Artificial Intelligence

### Description

Focuses on methods and best practices for developing explainable AI models and interpreting their results.

### Related Programme Learning Outcome(s)

- 1 – AI Awareness (EQF 5)
- 2 - Explainable AI (EQF 5)
- 3 - Soft Skills (EQF 5)

### Unit learning outcomes

- Advocates for ethical AI practices
- Understands and explains the theoretical foundations of explainable AI
- Implements techniques for developing explainable AI models
- Assesses the impact of AI systems on stakeholders
- Evaluates the trade-offs between model complexity and interpretability
- Develops guidelines and best practices for creating explainable AI solutions
- Communicates effectively the principles and benefits of explainable AI to non-technical audiences
- Leads interdisciplinary teams in projects that integrate explainable AI
- Cultivates an innovative mindset

### Delivery method(s)

- Workshop
- Lectures
- Case studies

### Materials

#### Lecturer Materials:

Tutorial Materials (Slide and Presentations)

### 4.11. Ethical and Legal issues in Data Science

#### Description

Explores the ethical and legal considerations in data science, including data privacy and responsible AI practices.

#### Related Programme Learning Outcome(s)

- 1 - AI Technologies (EQF 5)
- 2 - Big Data & Data Analytics (EQF 5)
- 3 - AI Ethics (EQF 5)
- 4 - Business Intelligence (EQF 5)
- 5 – AI Awareness (EQF 5)
- 6 - Machine Learning (EQF 5)
- 7 - Soft Skills (EQF 5)

#### Unit learning outcomes

- Assesses and addresses ethical, legal, and social implications of AI technologies
- Implements data governance and compliance measures
- Analyses and understands the foundational ethical theories and principles
- Evaluates AI systems for potential ethical issues and biases
- Develops guidelines and best practices for ethical AI
- Implements strategies for ethical auditing and compliance in AI projects
- Communicates effectively the importance of ethics in AI
- Leads multidisciplinary teams in ethical decision-making processes
- Stays abreast of emerging ethical issues and debates in AI
- Assesses ethical considerations in data handling and analytics
- Analyses the potential impacts of AI on society
- Discusses the challenges and risks associated with AI deployment
- Communicates effectively about AI technologies and their implications
- Participates in debates and discussions about the future of AI
- Advocates for ethical AI practices
- Assesses the ethical implications of machine learning projects
- Manages conflicts by implementing effective resolution strategies

#### Delivery method(s)

- Workshop
- Lectures
- Case studies

#### Materials

**Lecturer Materials:**

Tutorial Materials (Slide and Presentations)

**Student readings suggested:**

Barocas, S., & Boyd, D. (2017). Engaging the ethics of data science in practice. *Communications of the ACM*, 60(11), 23-25.



Artificial Intelligence Skills Alliance

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