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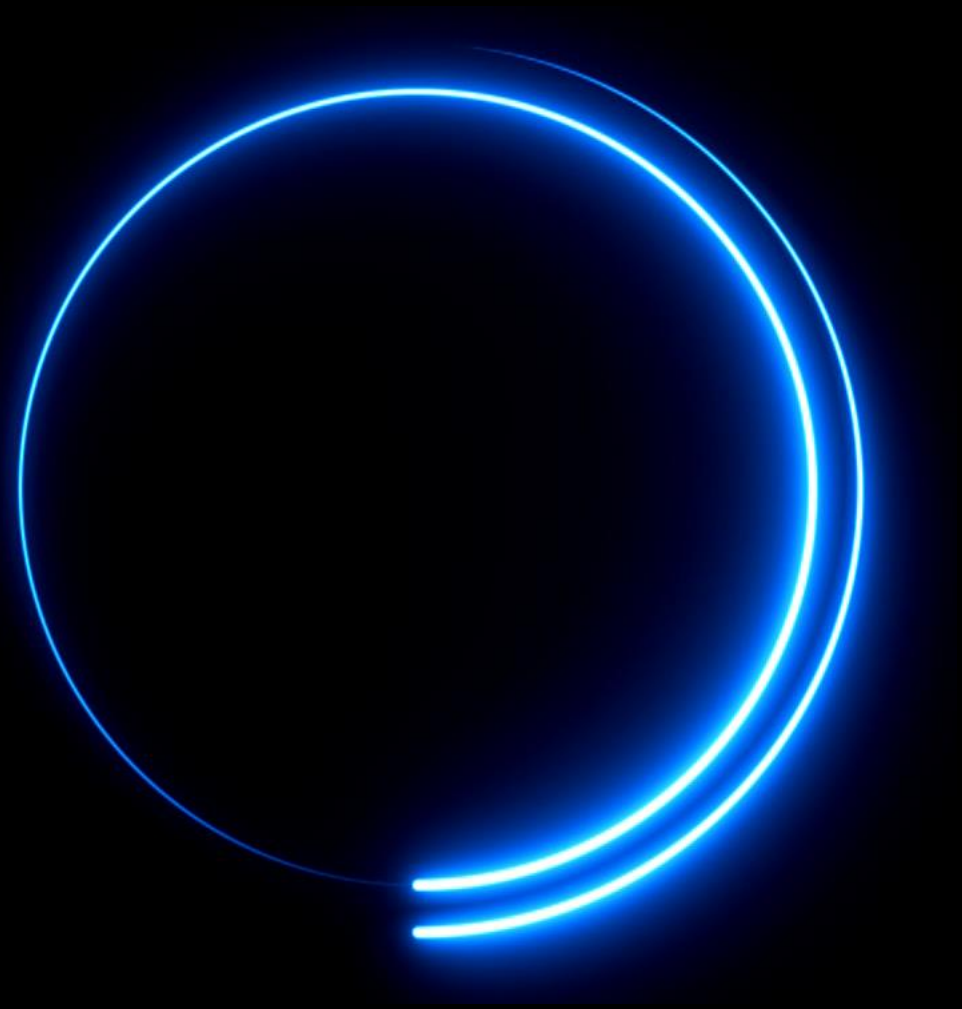


# Data Science & AI: Foundations

## A Unique Data Science & AI Training

JULY 2024


Why Data Science & AI


“There are going to be two kinds of companies by the end of this decade: those that are fully utilizing AI and those that are out of business”.
- Peter Diamandis, Digital Futurist, XPRIZE Founder

# AI Offers a Competitive Advantage

## COST REDUCTION

Reduce cost, typically by 30% or greater primarily through automating job functions and then undertaking job substitutions

***Call Center Operations***

*(Cross-Industry)*

## PROCESS EFFICIENCY

Create process efficiencies through automating standard tasks and reducing manual interventions

***Claims Processing***

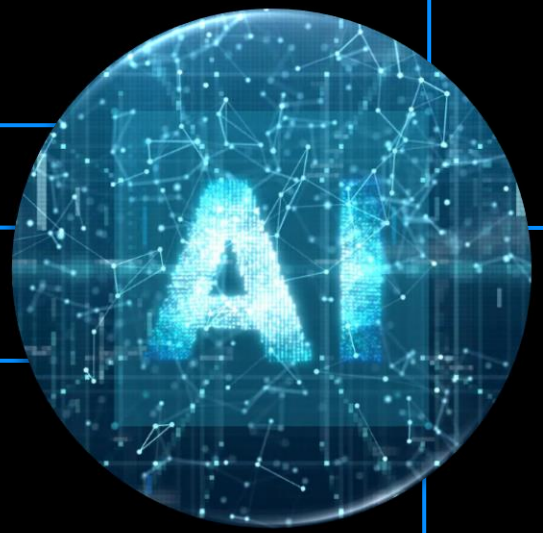
*(Insurance)*

## GROWTH

Increase revenue generation through hyper-personalized marketing for target customers

***Content Generation***

*(Marketing/Advertisement)*




## ACCELERATING INNOVATION (PRODUCTS/SERVICES)

Increase the pace of new product or new service development and speedier go-to-market

***Drug Discovery***

*(Life Sciences)*

## NEW DISCOVERY & INSIGHTS

Uncover new ideas, insights, questions and generally unleash creativity

***AI Augmented Financial Advisor***

*(Financial Services)*

## GOVERNMENT

Increase accuracy of various federal and local programs and create easier access for at-risk populations

***Welfare Distribution for Citizens***

*(Government)*

# Strategy must account for how AI will drive advantage

**A recent Deloitte survey of ~2,700 executives underscores the role of AI in driving competitive advantage and most organizations are making plans to harness its power broadly**

## 94%

**Critical to success**

of business leaders surveyed agree that **AI is critical to success over the next five years**

## 76%

**Increasing investment**

of respondents reported **they plan to increase their investments in AI** to gain more benefits

## 79%

**Fast-paced adoption**

of leaders surveyed reported **full-scale deployment for three or more types of AI applications**—up from 62% last year

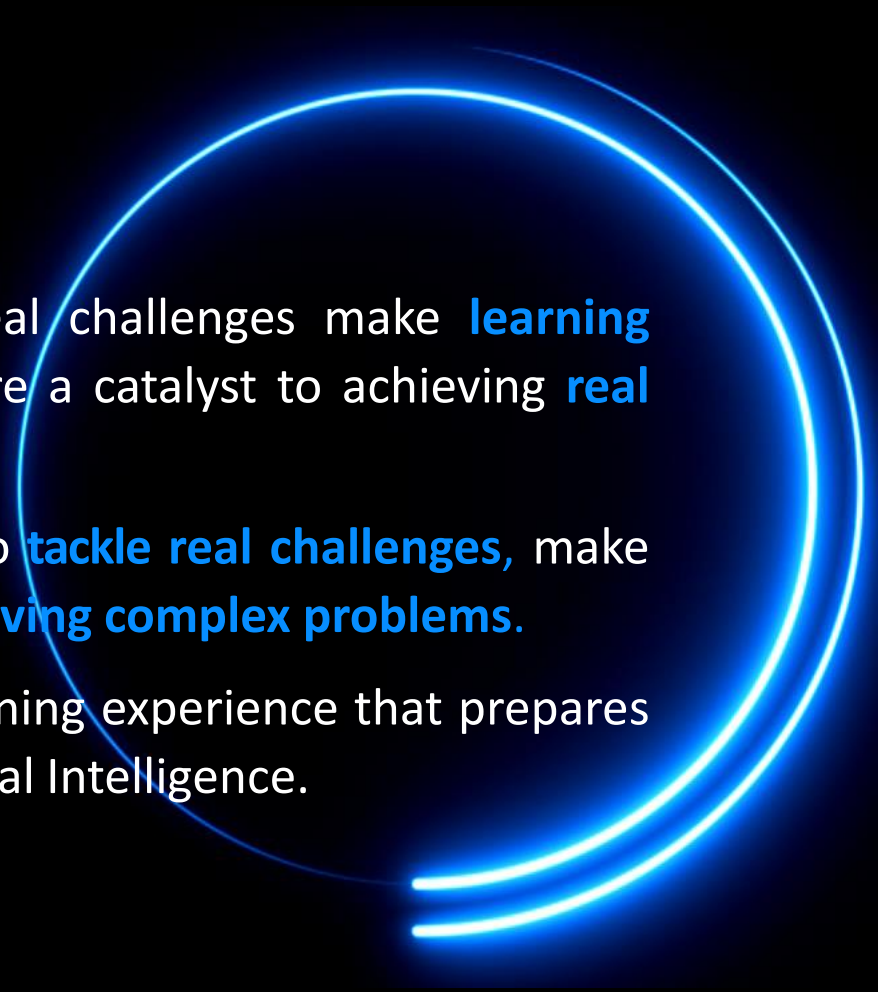
# A Unique Data Science & AI Training

# Data Science & AI: Foundations

Deloitte Academy in partnership with Eindhoven AI Systems Institute (EIAISI), brings to the Greek market a unique Data & AI training with “hands-on” experience on applicable real world AI projects. EAISI is the 1st Institute in the Netherlands to offer AI training with proven results over the past 5 years.

# Our Philosophy: Learning by doing

- We believe that the best way to learn is **by doing**. Real challenges make **learning motivating**, help to get your organization **involved**, and are a catalyst to achieving **real impact**.
- Company executives and professionals will have the chance to **tackle real challenges**, make **data-driven decisions**, and experience the satisfaction of **solving complex problems**.
- We're committed to providing an immersive, hands-on learning experience that prepares you **for success in the real world** of Data Science and Artificial Intelligence.



# A Competitive Edge for your Company

Your company will gain:

- Solid and hands-on understanding of machine learning and the development process for new data-driven applications.
- Business innovation, solution design and practical data-driven entrepreneurship: knowing what data & AI could bring to your organization, you master the skills to translate business goals and challenges to data science and AI questions.
- Capability to define a good data & AI project and organize a data-science team, and an understanding of the managerial challenges of shaping the analytics ambitions of the organization.
- Understanding of the opportunities and practical applications of data science in your industry.

# 1 Course - 2 Learning Paths

**PATH FOR BUSINESS EXECUTIVES**

For professionals who, despite not having a background in technology, want to learn and understand how Data Science and Artificial Intelligence influence their fields.

**It will be of value for your organization to send at least one participant to each track, as this will allow:**

- **developing more realistic project ideas during the course**
- **using combined input from both business / domain expertise as well as data expertise**
- **greatly enhance collaboration and mutual understanding in consecutive data science efforts in the organization.**

**PATH FOR TECH EXPERTS**

For professionals who want to learn to develop machine learning solutions, and who are also interested to learn the business implications of Data Science and Artificial Intelligence.

# Program Timeline & Objectives

## WEEK 1 - SEPTEMBER

| | *Day 1 Sep 23rd* | *Day 2 Sep 24th* | Break day Sep 25th | *Day 3 Sep 26th* |
|---|---|---|---|---|
| Content | Introduction lecture on Data Science & AI and Statistical Learning. | Business understanding. Identify project objectives. | | Data understanding. Collect and review data. |
| Learning objective | Have a good overview of the world of data science and a realistic understanding of data science | Be able to translate a goal into a modelling question about X and Y variables, be able to map opportunities for data science on a roadmap encompassing multiple innovation horizons. | | Have a good overview of the different techniques available in the field of data science which should further empower you in your role as either a data scientist or analytics translator. |

6-week break

## WEEK 2 - NOVEMBER

| | *Day 4 Nov 11th* | *Day 5 Nov 12th* | Break day Nov 13th | *Day 6 Nov 14th* |
|---|---|---|---|---|
| Content | Data preparation. Select and clean data. | Modeling, manipulate data and draw conclusions. | | Evaluate model and apply conclusions to business. |
| Learning objective | To be able to assess the viability and potential of candidate data science/machine learning projects in your organization. To be able to execute a data science project using the CRISP-DM methodology. | To grasp the basic principles underlying data science / machine learning problems and know how to apply them. | | To understand and apply commonly used machine learning techniques in Python or KNIME and integrate them in a pipeline to load, explore, prepare and model data, and evaluate the results. An introduction to generative AI (e.g. ChatGPT) and how to make it contribute to company KPIs. |

# Learning Tracks

| WEEK 1 - SEPTEMBER | | | | | WEEK 2 - NOVEMBER | | | |
|---|---|---|---|---|---|---|---|---|
| *Day 1*<br>*Sep 23rd* | *Day 2*<br>*Sep 24th* | Break day<br>Sep 25th | *Day 3*<br>*Sep 26th* | 6-week break | *Day 4*<br>*Nov 11th* | *Day 5*<br>*Nov 12th* | Break day<br>Nov 13th | *Day 6*<br>*Nov 14th* |

**Both Tracks**

- Participants from both Business Executive and Tech Expert tracks will immerse starting with an introduction lecture on Data Science & AI and **will learn about the possibilities and limitations of AI** and thereby strongly increase their understanding of what types of projects are (in)feasible data science projects, i.e. to what extent is AI a hype and to what extent can it actually add value to an organization
- Participants in both tracks **will get intimately familiar with the different phases of a typical data science project** (as outlined by CRISP-DM) throughout the six day course, both in terms of theory as well as by working through an example project Statistical Learning.

**Business Executives**

Participants also experience executing a data science project but in a light (drag and drop) version. Exposure to project execution serves to **understand the challenges a data scientist will struggle with, and to be a better collaborator with data scientists in an actual data science project** (facilitating the role of Analytics Translator). In addition, participants focus more intensively on project selection, project scoping and typical project pitfalls, thereby developing a stronger intuition regarding the feasibility of projects, and becoming better equipped to take on a role where data science project ideas can be prioritized.

**Tech Experts**

Participants **focus on executing / working / programming through a project and experiencing how much work it actually is,** and how much aligning is required with domain experts in order to use the right data and prepare it in the right way (and understanding that much more is needed than just running some machine learning model).

# TECHNOLOGY USED

Software mentioned in both tracks is freely available

## Tech Experts:

Techniques include python scripting in Jupyter Notebooks in Visual Studio Code. Package installation and version management is managed by virtual environments using pyenv. The exercises and data are provided via GitHub.

- Required installations: Visual Studio Code, virtual environment, and a series of python packages. Installations are done before the course starts and are facilitated by a step-by-step instruction guide.
- Before the course: participants download data and go through pre-readings on the online learning environment.
- During the course: participants will program and will need internet access, as part of the learning experience is in learning how to effectively use online tools like chatGPT to debug code (and coding to a large extent boils down to searching online for how to solve the bugs you run into)
- For participants that did not manage to set up their computers with the right software, there is a plan B available where participants can work and program in an online environment. This does not require any installations, only an internet connection. We do not stimulate this approach in any way, as it is part of a data scientist's toolbox to get familiar with setting up a work environment.

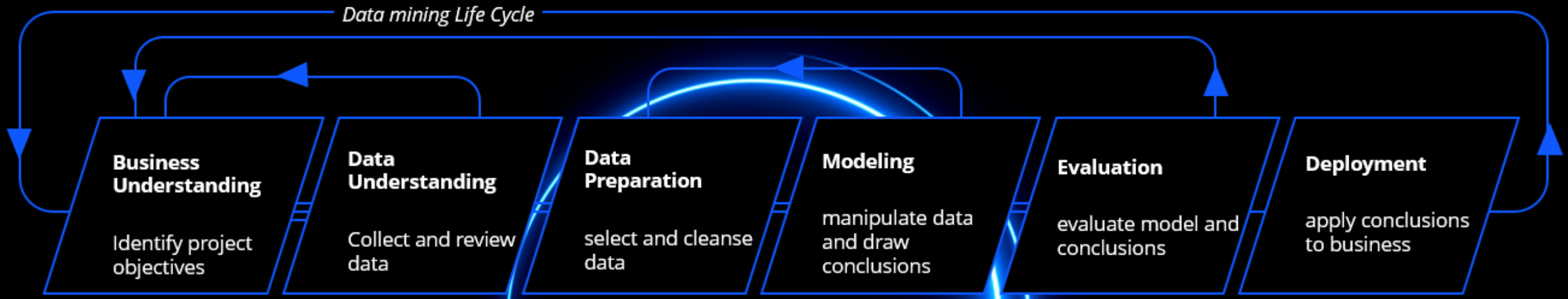

## Business Executives:

Participants use KNIME Analytics to explore, prepare and model data and to evaluate the results. KNIME does not require any coding and uses a drag & drop interface which allows the user to quickly and intuitively build a data pipeline.

- Required installations: participants install KNIME Analytics before the course starts. Installation is facilitated by a step-by-step instruction guide
- Before the course: participants download data and go through pre-readings on the online learning environment.
- During the course: people can work with KNIME on their computer without an internet connection.

# EXECUTING A MACHINE LEARNING DATA SCIENCE PROJECT

## DEEP DIVE




**Determine Business Objectives**

*Background*
*Business Objectives*
*Business Success Criteria*
(Log and Report Process)

**Assess Situation**

*Inventory of Resources, Requirements, Assumptions, and Constraints*
*Risks and Contingencies*
*Terminology*
*Costs and Benefits*
(Log and Report Process)

**Determine Data Mining Goals**

*Data Mining Goals*
*Data Mining Success Criteria*
*(Log and Report Process)*

**Produce Project Plan**

*Project Plan*
*Initial Assessment of Tools & Techniques*
*(Log and Report Process)*

**Collect Initial Data**

*Initial Data Collection Report*
(Log and Report Process)

**Describe Data**

*Data Description Report*
(Log and Report Process)

**Explore Data**

*Data Exploration Report*
*(Log and Report Process)*

**Verify Data Quality**

*Data Quality Report*
*(Log and Report Process)*

**Data Set**

*Data Set Description*
(Log and Report Process)

**Select Data**

*Rationale for inclusion/exclusion*
(Log and Report Process)

**Clean Data**

*Data Cleaning Report*
*(Log and Report Process)*

**Construct Data**

*Derived Attributes*
*Generated Records*
*(Log and Report Process)*

**Integrate Data**

*Merge Data*
*(Log and Report Process)*

**Format Data**

*Reformatted Data*
*(Log and Report Process)*

**Select Modeling Technique**

*Modeling Technique*
*Modeling Assumptions*
(Log and Report Process)

**Generate Test Design**

*Test Design*
(Log and Report Process)

**Build Model Parameter Settings**

*Models*
*Model Descriptions*
*(Log and Report Process)*

**Assess Model**

*Model Assessment*
*Revised Parameter*
*(Log and Report Process)*

**Evaluate Results**

*Align Assessment of Data Mining Results with Business Success Criteria*
(Log and Report Process)

**Approves Models**

*Review Process*
*Review of Process*
(Log and Report Process)

**Determine Next Steps**

*List of Possible Actions*
*Decision*
*(Log and Report Process)*

**Plan Deployment**

*Deployment Plan*
(Log and Report Process)

**Plan Monitoring and Maintenance**

*Monitoring and Maintenance Plan*
(Log and Report Process)

**Produce Final Report**

*Final Report*
*Final Presentation*
*(Log and Report Process)*

**Review Project**

*Experience Documentation*
*(Log and Report Process)*

# A visual guide to CRISP-DM methodology

# TARGET AUDIENCE

By leveraging AI technologies and analytics capabilities, each **C-suite function can gain valuable insights,** automate routine tasks, and make more informed decisions, ultimately **driving business growth, efficiency, and competitive advantage.**

**CEO or C-Suite level, preferably in pair with a Tech Expert.**
Business Executives with 10+ years of experience.
Tech Experts with 6+ years of experience.
Chief Finance Officer (CFO), Chief Technology Officer (CTO), Chief Information Officer (CIO), Chief Innovation Officer, Chief Marketing Officer (CMO), Chief Data Officer (CDO), Chief Analytics Officer (CAO), Chief HR Officer (CHRO).

Executives which are benefited as below:

- **In finance**, executives may use AI for risk management, fraud detection, and algorithmic trading.
- **In healthcare**, executives may leverage AI for personalized medicine, medical imaging analysis, and healthcare operations optimization.
- **In shipping,** executives can drive significant improvements in efficiency, cost-effectiveness, safety and customer satisfaction.
- **In retail**, executives may apply AI for demand forecasting, customer segmentation, and personalized marketing.
- **In manufacturing**, executives may utilize AI for predictive maintenance, supply chain optimization, and quality control.
- **In technology**, executives may lead AI-driven product development, innovation initiatives, and strategic partnerships.

Overall, advanced training in Data Science and AI is valuable for business leaders and executives across industries, enabling them to harness the power of data-driven insights and AI technologies to drive innovation, improve decision-making, and achieve strategic objectives.

# The Lecturers

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**Pieter Overdevest**
Lecturer, EAISI Academy

## Experience

Pieter's professional journey unfolds as a compelling narrative, woven over an extensive 23-year tapestry of expertise in the intricate domains of clinical operations and data science. Throughout his illustrious career, he has been a cornerstone of success within both national and multinational companies in the Netherlands, contributing significantly to the advancement of these organizations through his invaluable insights and strategic acumen.

In addition to his stellar corporate achievements, Pieter has dedicated over 4 years to the noble art of lecturing. Within the academic sphere, he has emerged as a beacon of knowledge, passionately imparting the wisdom gained from his extensive industry experience to the next generation of professionals. His commitment to education reflects not only a deep understanding of theoretical frameworks but also a hands-on, practical approach that enriches the learning experience for his students.

## Education

- **Professional Doctorate in Engineering, Data Science**
  Jheronimus Academy of Data Science
- **PhD in Bioseparation Technology**
  Wageningen University & Research
- **Bachelor of Science in Bioprocess Technology**
  Wageningen University & Research

**Joran Lokkerbol**
Program Director &
Lecturer, EAISI Academy

## Experience

Joran has got more than 7 years of experience as a data scientist, during which managed to make a series of impactful contributions, demonstrating a keen ability to derive meaningful insights from complex datasets.

Beyond his corporate endeavors, Joran seamlessly transitions into the academic realm, where he has dedicated approximately 5 years to the art of lecturing. His tenure in academia showcases not only his mastery of theoretical concepts but also his adeptness at imparting knowledge to eager minds. Joran's dual experience as both a seasoned data scientist and a respected lecturer underscores his versatility and commitment to advancing the frontiers of both industry and education.

## Education

- **Postdoc in Applied Econometrics and machine learning**
  Harvard University
- **PhD in Health Economics**
  Vrije Uviversiteit Amsterdam
- **Master of Science in Econometrics and Quantitative Economics**
  University of Amsterdam

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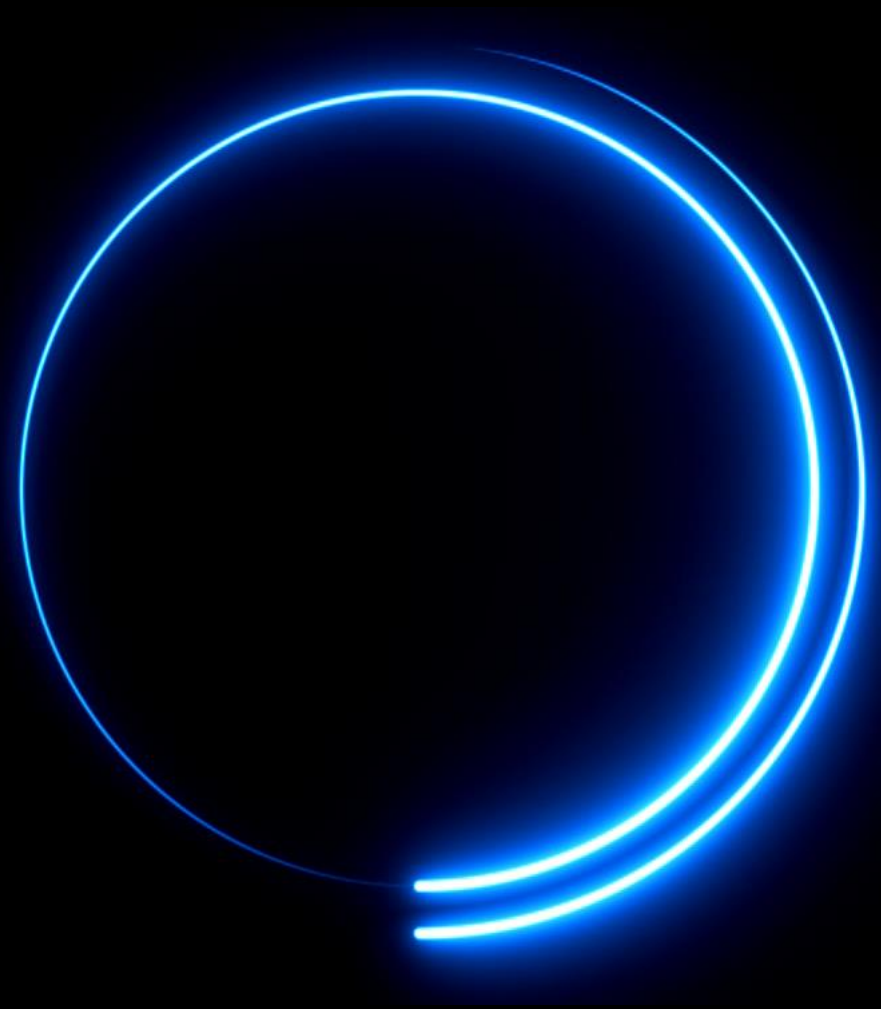
Upon completion of this course, you will have the opportunity to enroll in two additional, more advanced courses:

## 2. Applications of Data Science & AI

In the second module, participants will delve deeper into practical applications of MDAI. This stage focuses on real-world scenarios, case studies, and hands-on experiences to solidify knowledge.

## 3. Mastering Data Science & AI

The final module represents the pinnacle of our program. Here, participants will master advanced techniques, tackle complex challenges in their own organization, and gain the expertise needed to excel in MDAI.



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