



# **Professional Masters in Data Science and Leadership**

**Prepare for the hottest job in the tech age by mastering the skills in data science**

**The Professional Masters in Data Science and Leadership at a Glance**

**Programme Title:** Professional Masters in Data Science and Leadership

Duration: 19 months

Start Date: November

Education Model: Online

Credits: 60 ECTS

Courseload: 15-20 hrs a week

## **PROGRAMME DETAILS**

### **Why Data Science?**

The immense volumes of data generated since the dawn of the digital age is now taking over the world and changing the way we understand business, people and their behaviours. Organisations from the sciences to healthcare, from finance to the Internet are trying to make sense of the big data originating from a dizzying array of sources and they are on the lookout of skilled people to help lead their business using big data.

According to Glassdoor Job Score determined by three combining factors: number of job openings, salary and overall job satisfaction, Data Scientist is ranked number one with a median base salary of \$110,000 and 4,524 job openings in the USA. Harvard Business Review names “data scientist” job as the sexiest job of the 21st century. It also points to a shortage of data scientists becoming a serious constraint.

### **The Skill Set You Will Acquire**

#### **Python Programming**

- Construct your own functions with the appropriate typings and docstrings in Python
- Discover the power of iterators using various built-in functions
- Control error handling in Python
- Write your own Python classes and methods
- Experiment with Python classes' inheritance

#### **Data Handling**

- Apply the basic operations of the pandas module in Python
- Convert raw data into a form ready for analysis.
- Tidy and clean data for analysis.
- Solve complex data manipulation problems using the pandas module
- Perform Exploratory Data Analysis (EDA)

#### **Data Collection**

- Import/Export data from various sources in Python using pandas
- Pull data from APIs using JSONs.

#### **Data Communication**

- Generate plots in a pythonic way using matplotlib
- Create meaningful and aesthetic visualisation using seaborn to communicate findings
- Communicate, present and interpret critical data-driven findings and insights to different stakeholders

#### **Statistical Analysis**

- Discover the mathematical foundations of hypothesis testing and regression
- Construct and test statistical hypotheses and interpret their outcome appropriate to the context
- Explain the difference between iid and time-series data

- Experiment with regression analysis in counting and binary data via generalised linear models

### **Machine Learning**

- (Re)Construct the goals and the thinking behind developing and using ML methods
- Demonstrate expertise in the use of supervised ML algorithms using sklearn package

### **Machine Learning Model Building**

- Create tree-based methods to create more powerful and explainable ML models
- Distinguish between supervised and unsupervised methods and apply the appropriate algorithm in each problem
- Compare models for accuracy and efficiency to find an optimal solution to a data problem.

### **Deep Learning**

- Ethically evaluate various aspects of Deep Learning with a focus on NLP and Computer Vision
- Interpret the logic behind the mathematical foundations of neural networks and the rationale behind them
- Demonstrate an understanding of predictive models based on structured and unstructured data

### **Natural Language Processing**

- Interpret NLP problems as ML problems and apply traditional methods as long as state-of-the-art transformers architectures

### **Computer Vision**

- Experiment with different CV architectures on famous datasets like the MNIST dataset

### **Explainability and Ethics**

- Apply state-of-the-art computational methods on top of the ML algorithms to evaluate the algorithm's predictions
- Identify the limitations of ML methods in terms of the ethical aspects and introduced in differential privacy

### **Action Research**

- Evaluate your data science professional context, collect and analyse in-depth information and present the new information in a scientific way.
- Critically evaluate your current situation and prepare an action plan to improve the practice of your organisation or community, based on data or a set of impactful actions

### **Coaching**

- Practice and use a coaching model and steps as an inquiry and leadership tool as part of your action research practices in a data science context

### **Team Facilitation**

- Practice and use facilitation techniques as an inquiry and leadership tool as part of your action research practices in a data science context

### **Communication**

- Propose ideas in a clear and concise manner orally, visually and in writing to initiate change or influence your context
- Appropriately adapt your message, style, and tone to accommodate a variety of audiences such as peers, specialists, non-specialists, superiors or clients in a professional context.
- Respectfully listen to group members to gain a full understanding of issues.

### **Accountability**

- Act as an accountable member of your learning and professional community taking ethical and moral responsibilities of your actions as a data scientist and a practitioner researcher in your business context.

### **Interpersonal Awareness**

- Relate with one another by demonstrating a true understanding of perceptions, behaviours, attitude and skills of yourself and each other to be able to work in harmony

### **Team-Play**

- Cooperate with your peers, colleagues & superiors to accomplish common goals across your organisation within changeable and unknown environments with a high level of uncertainty.
- Act with dignity and respect and maintain a friendly demeanour and value the contributions of others.

### **Being a Trusted Advisor**

- Guide and influence people and their actions at the organisational level by proposing solutions to complex data science problems as part of your action research inquiry.

### **Self-Learning**

- Set and follow-up on your learning objectives to continue your personal and professional learning in an autonomous manner.
- Recognize your own learning style and adapt your self-learning process accordingly.

## **CURRICULUM**

### **Foundational Module 0: Introduction to coding thinking & statistics (Compulsory for those who can't meet the passing criteria in the entry test)**

This introductory module is designed for students who feel they do not fully meet the basic entry knowledge level or who would like to refresh their skills. Its aim is to give those without programming/coding experience a gentle introduction to programming thinking. While language agnostic, this introduction will give the students the required skills to keep up with the computational and statistical background needed to complete this program.

### **Data Science Certificate (Month 1 – 9)**

<b>Module 1: Embarking on Data Science and Engaging with the Programme &amp; Each Other</b>	<b>Module 2: Python for Data Science</b>	<b>Module 3: Exploratory Data Analysis (EDA)</b>
Engage with each other and the programme, and explore the data science domain and essential data science competencies in this module. Discover your learning preferences and practice how to work with your action learning group.	Build on your pre-existing programming knowledge and give you a practical start with basic and intermediate level Python programming such as functions, iterators and lists. You will also be introduced to object-oriented programming (OOP)	Build on your skills in DataFrames in pandas, learn how to leverage pandas' powerful data manipulation engine by extracting, filtering, and transforming data. Acquire the understanding and the skills to wrangle and extract data from relational databases using a language called SQL.
<b>Module 4: Data Visualisation and Statistic</b>	<b>Module 5: Introduction to Machine Learning</b>	<b>Module 6: Advanced Topics</b>
Become a master at communicating your insights by creating interactive data visualisations and hone your hacker statistics toolbox by performing statistical inferences, constructing and testing your hypotheses.	Deep dive into the brains of data science and artificial Intelligence, machine learning. Build predictive models and evaluate how well they perform in different scenarios.	Start your journey on deep learning, also known as neural networks, starting from the theoretical foundations and ending up in building your own neural networks. You will be introduced to certain ethics limitations of ML and also how interpretability of the ML models can help ease these concerns.

## Leadership and Action Research Certificate (Month 9 – 14)

<p><b>Module 1: Introduction to Action Research and Academic Writing</b></p>	<p><b>Module 2: Construct your Project Idea through Coaching within an Organisation (Cycle 1)</b></p>
<p>Begin your leadership journey by developing self awareness about your intentions, values and beliefs as an individual to better understand and articulate your purpose in life. Adopt a mindset and a set of tools for developing a systematic reflection and reflexivity to be more self-conscious and resilient in your professional life and learn about action research and academic writing in relation to data science.</p>	<p>Develop your 1-1 coaching skills that will leverage your relational capacity in your professional life. With references to psychological theories on individual human behaviour and social interaction, learn about the basis of growth and development for yourself as well as your future clients.</p>
<p><b>Module 3: Improve your Project Idea through Team Facilitation within an Organisation (Cycle 1)</b></p>	<p><b>Module 4: Plan and Propose your Action Plan to the Organisation (Cycle 1)</b></p>
<p>Acquire the essentials of group-facilitation and team-coaching to enhance effectiveness in your teams. Learn about the fundamentals of team facilitation and coaching including creating an inclusive environment, leading decision-making and problem-solving processes, encouraging high performance and effectively addressing poor performance in your teams.</p>	<p>Adopt an organisational perspective and develop advanced-level context-sensitive skills that are required in deciding on developmental interventions. Acquire a set of techniques and tools - such as data storytelling - that are intended to increase your professional impact.</p>

## **Final Project (Month 14 – 19)**

- Use a practical and structured way of applying action research in your workplace/ an organisation/as a freelance data scientist.
- Design and execute a work-based project using Action Research Methodology and Insider Research.

## **THE LEARNER EXPERIENCE**

### **Flexible and Innovative**

The programme is very flexible and designed to fit the needs of a 21st century student. We offer an interactive part-time learning experience, which means that you are able to study the content at your pace, while still being part of an engaging learner community.

### **Interactive and Communal**

While part of the programme is self-paced, you are part of a community of experts with whom you regularly interact in live workshops, action learning sets, webinars, and other digital sessions. Each cohort is supported by course facilitators, mentors, and community managers to enhance and accelerate their learning experience.

### **Holistic and Practice-Based**

You not only gain the technical skills required on the job market, but also develop the leadership skills and a business mindset that employers appreciate. You will work on weekly assignments and projects, both individually and with peers, so that you gain practical evidence and can showcase evidence of your gained knowledge and skills.



## **CORNERSTONES OF THE ELU LEARNER EXPERIENCE**

**Workshops:** Weekly workshops led by a course facilitator who is a field expert help you define and understand the why, what, how, and what if of the modules. The workshops are a great opportunity to learn by practice and interact with your peers.

**Digital Learning Resources:** In parallel with weekly workshop topics, you have access to digital resources curated specifically for your programme modules. All content is available within the related week under the modules on Campus. You are also provided a general-purpose e-library (Pluralsight) which is also accessible on Campus.

**Action Learning Sets :** While some of the learning experience is self-directed, you belong to an action learning set of 4-7 people. Action learning sets take place in between weekly workshops and provide the chance of receiving peer support for a challenge or a problem that you are facing during the programme. You join an action learning set once a week, and it is self-organised. To get you started with the format, you receive several workshops on how to conduct action learning sets on your own.

**Mentoring:** As part of your action learning experience, you also get to meet your Mentor as a group biweekly. Your mentor is a field expert with extensive experience and knowledge. You interact with your mentor on a regular basis to receive support throughout the programme. Mentors help you gain mastery in your field of study as well as receive tips and guidance towards employability. Please remember that your mentors do not proof-read your assignments or give direct answers to your technical questions.

**Assignments & Projects:** You work on and solve real-world problems in each assignment and project. You get the chance to put your learning into action and build a portfolio along the way. Every week you are given an assignment while at the end of each module you are given a module project which is more comprehensive and challenging.

**Peer-to-Peer Learning:** We believe that peer-learning is an important element for success, and we see this as one of the core features of each programme. Some of the assignments and projects are designed in such a way that you work together as peers and develop your teamwork skills as well as learn from one another.

**Town Halls:** A Town Hall is an online event led by one of our community managers in which we regularly share ideas and feedback - but also create a space to celebrate achievements and share exciting news with one another. Town Halls are generally held bimonthly.

## **TALENT ACCELERATOR PROGRAMME**

Employability is at the core of all ELU programmes. We strive to provide you with the best learning environment and a community in which you can acquire transferable skills and develop your professional profile for future employment. We adopt a competency-based learning model, and focus on your mastery of technical skills and leadership skills in our curriculum. The portfolio you build during the foundation course enhances your chances for employability, therefore you are encouraged to build a strong portfolio and make use of the provided career guidance by your mentor.

For those interested in job and traineeship opportunities in the Netherlands, we offer a separate Talent Accelerator Programme. With a shortage of tech talent in the country, there are many different types of organisations who are looking to hire job-ready talent.

### **What is the Talent Accelerator Programme?**

The Talent Accelerator Programme is a set of activities designed to improve your employability. These are additional sessions and services offered outside of the regular course-related content and workshops. The following is an example of what to expect as part of the programme:

- Access to ELU Job Portal
- Mentoring and coaching for career purposes, i.e. interview preparation, CV screening
- Employer meet-ups (taking place in Amsterdam or online)
- Hackathon (taking place in Amsterdam or online)

The Talent Accelerator Programme starts once students have finalised the Data Science Certification in our programmes.

### **Prerequisites for The Accelerator Programme**

This programme is invitation only. This means you must be in good standing to join the talent accelerator programme. You should demonstrate mastery in the competencies of the certificate, fulfil your community commitments creating a presence and prove accountability. We measure accountability when there are multiple cases of submitting assignments after the deadline has expired. It might also be important to possess a certain level of previous professional experience.

It is important that we get to know you through presence and participation in the programme. You actively participate in learning accelerators like action learning sets and mentoring as well as community activities like town halls, and are accountable to the greater European Leadership University community. First and foremost, we expect you to be an inquisitive learner who is supportive to their peers in the cohort.

Joining the Accelerator Programme cannot guarantee (immediate) placement in a Dutch company.

## **ADMISSIONS**

### **Who should apply?**

You should join this programme if you want to start a new career in data science or upgrade your skills and boost your employability for data science jobs, if you consider working as a free-lance data scientist or want to start your own business.

We evaluate and review each application holistically, and consider your educational background, professional experience, and motivation in your admission decision. While we welcome a diverse group of talent with each cohort, we generally note that those who are most successful in the programme share:

- A bachelor's degree in a computing field or its equivalent in STEM (Science, Technology, Engineering & Mathematics)
- Intermediate knowledge & experience in Statistics and Calculus
- Knowledge and experience of Python programming

You must have the following language proficiency in English. TOEFL Computer-based Internet-based: 234 or 90-91 IELTS 6.5 (minimum 6.0 in each band)

### **Admission Process**

1. **Application:** Fill in the online application form, including an up-to-date resume and a motivation statement.
2. **Selection:** Our academic board will review your application. Shortlisted profiles are requested to conduct an online analytical thinking test and interview. You will then be notified about the result of your application.
3. **Enrolment:** Upon acceptance, you are asked to confirm your seat in the cohort by paying the registration fee and signing our Community Guidelines. We also ask you to submit a copy of your academic diplomas and transcripts, passport, and English proficiency test scores.
4. **Entry test for basic programming:** Upon enrolment, you will be required to complete an entry test for basic programming and statistics. Those who pass the test will be able to start the programme from Module 1. Those who don't pass the test, will be required to complete a Foundational Module (4 weeks) before the start of the programme.

## **TUITION AND PROGRAMME FEES**

The total tuition for this programme is 9000 Euros.

We offer two payment models:

1. **Instalments:** Pay in instalments while you study
2. **Deferred Tuition Scheme:** Start at only 99 Euros a month, and pay your tuition when you get a job.

### **The Deferred Tuition Scheme**

With the ELU Deferred Tuition Scheme, you are able to defer your tuition up to 5 years - until you get a job.

You can start the programme by paying 99 Euros a month – this is a membership fee that gives you access to all the digital learning content; to the learning accelerators like workshops, mentor support, and action learning; and to all the community channels.

In addition, we require a fee to issue your certifications and diploma:

<b>Data Scientist Certification:</b>	€485
<b>Data Science Master's Diploma:</b>	€985

You are able to defer your tuition for up to 5 years, starting from the time of your enrollment. All you need to do to defer your tuition, is to be and stay a member of the ELU community by paying your membership fee and, as desired, taking part in ELU community activities. Any membership fee paid after you graduate is deductible from your remaining tuition.

## **RESEARCH VISA**

Master's students of European Leadership University have the opportunity to qualify for a Research Visa after their Data Science certification to conduct their practitioner research in the Netherlands. Students who successfully pass the certification stage can apply for the Research Visa to conduct their research in the Netherlands.

### **Benefits of the Research Visa:**

- Opportunity to do your Master's research in the Netherlands.
- Freedom to work without a work permit in the Netherlands while studying.

[Learn more here](#)

**Visa Duration:** The Research Visa is issued for 1 year, which can also be renewed. After graduation, students can apply for an orientation Visa which will enable them to find a Job while transitioning to a work Visa in the Netherlands.

### **Research Visa Criteria:**

- Must be a registered Master's Student of European Leadership University
- Successfully passED the certification stage

**Visa Approval Conditions:** The Research Visa is subject to approval by the University and IND.

European Leadership University (ELU) is recognized as an EU Research Institution with Research Sponsorship Status according to Directive (EU) 2016/801 and also is listed in the National Academic Research and Collaborations Information System (NARCIS).

[Learn more](#)

For more information, please email [lahouari@elu.nl](mailto:lahouari@elu.nl)

## **TESTIMONIALS**

*“ELU is bridging the gaps between MOOCs and traditional education. With the Data Science bootcamp, I feel that I am near to a perfect data scientist. We have weekly workshops where we are guided thoroughly by facilitators, we are guided by mentors, and we have weekly assignments and projects so that helps me to build on my skill consistently.*

*With the Leadership bootcamp, it is not like a traditional project or time management course. ELU teaches you about self-leadership, how to be a good coach and consultant, and how you can make a difference in an organisation by knowing yourself better. We students became the consultant to the client and it was very much like you're working in the industry. So the assignments are not just assignments, they are real-time projects where you feel you are there.*

*I am getting more connected to myself, my studies, and my role as a data scientist.”*

### **Trishala Basti, February 2019 Cohort**

*“After exploring some professional experience in the tech domain, I've figured out Data Science was the right path to pursue. Having gone through various online courses, I was looking for some proper degrees in this domain. That's when I came to know about ELU.*

*Feasibility, facilitator profiles, and the vision to change the learning practice is what attracted me towards ELU. Extremely talented instructors, very interactive administrative staff, and frequent interaction with the higher authority of the university never made me regret. The extremely diverse student background made the journey more exciting.*

*I've learned soft-skills like problem analysis, leadership, team-working, and project management. The learning in the data science field has come handy for me in achieving my career goals. With ELU, I find myself a step closer to being a perfect data scientist.”*

### **Sarthak Pokharel, February 2019 Cohort**

*"I chose ELU because of flexibility. As a working professional I wanted to upgrade myself with data science skills. At ELU, I can continue my job while upskilling myself. We have mentors and facilitators that really help you to be more accountable for your own learning. That helped me to speed up my learning and become a data scientist.*

*I was amazed by the Leadership Bootcamp. The kind of leadership training given at ELU is very unique; I have not seen it in my professional career. The coaching and consultancy skills are specific to what is required in the market. As a data scientist, everyone should have these skills.*

*The Employer Meetup was very surprising to me. When I came to the meetup, there were more than 30 recruiters and pioneers there. It was very exciting as well as challenging to present our pitch to each of them. I got a chance to network with those who are starting their business in AI, recruiters, and data science pioneers. It was strategic to make a network in my domain."*

**Mani Jangde, February 2019 Cohort**

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