



Project „MSCA Industrial Doctoral Network on Digital Finance

Reaching New Frontiers” (**DIGITAL-101119635**)

Course Booklet

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Introduction

Welcome to our Marie Skłodowska-Curie Actions (MSCA) Doctoral Training Network in Digital Finance!

In the ever-evolving landscape of finance, the integration of digital technologies is reshaping the industry, creating unprecedented opportunities and challenges. Our rigorous and interdisciplinary doctoral training programme in Digital Finance leverages the wealth of knowledge that is represented in the network, ranging from prominent researchers at world-class universities to executive-level practitioners at prominent financial institutes. Building upon this foundation, the network is designed to equip scholars, practitioners and future leaders in digital finance with the knowledge and skills necessary to navigate and innovate within this dynamic field.

Our program offers a comprehensive curriculum that covers a broad spectrum of topics, including artificial intelligence, blockchain technology, cryptocurrency, fintech innovations, data analytics, and regulatory frameworks. Through a blend of rigorous academic coursework, hands-on research activities, and real-world applications, doctoral candidates will gain deep insights into the transformative impact of digital finance on global markets.

Participants will benefit from:

Expert faculty: Learn from leading scholars and industry practitioners who are at the forefront of digital finance research and development.

Innovative research opportunities: Engage in cutting-edge research projects that address the pressing challenges and opportunities in digital finance.

Interdisciplinary network: Explore the intersection of finance, technology, economics, and regulation to develop a holistic understanding of the digital finance ecosystem.



Collaborative learning environment: Join a vibrant community of scholars and professionals, fostering collaboration and knowledge exchange.

Career development: Gain access to a network of industry contacts and career resources to support your professional growth and success in the digital finance sector.

Whether you are aiming to pursue an academic career, lead innovative projects in the financial industry, or shape policy and regulation, our doctoral training courses provide the foundation and expertise you need to excel. Join us to become a pioneer in the future of finance.

The MSCA Digital Finance training programme is offered by:

- University of Twente
- Kaunas University of Technology
- Vienna University of Economics and Business
- Bucharest Academy of Economic Studies
- Babeş-Bolyai University
- University of Naples Federico II
- Bern University of Applied Sciences
- European Central Bank
- Fraunhofer Institute
- Royalton Partners
- EIT Digital
- Raiffeisen Bank International AG

Course material for our Digital Finance Doctoral Network will be made available through the links below. These resources include essential readings, lecture slides and -recordings, codebases, quizzes and supplementary materials to support students in Digital Finance.

<https://quantlet.com>

<https://quantinar.com>



<https://github.com/MSCA-DN-Digital-Finance>

Please note that the doctoral programme is subject to updates. For the most recent course overview, you may consult

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Fundamental scientific training

As part of their training, each doctoral candidate will complete courses in fundamental skills, focusing on core introductory subjects. These courses provide a strong foundation in essential areas such as data science, artificial intelligence, sustainability and ethics, ensuring that candidates are well-prepared for more advanced study and research throughout their doctoral program.

1. Foundation of data science

Institute: Babeş-Bolyai University

Teacher(s): Codruta Mare, Joerg Osterrieder (University of Twente)

Credits: 4EC

Course summary: 'Foundation in Data Science' offers a comprehensive journey through the intricacies of data science processes, with a focus on financial applications. This course introduces doctoral candidates to a diverse array of topics and concepts essential for navigating technical pipelines, ranging from data collection and data cleaning to visualization and extracting managerial insights. Candidates will explore methodologies for efficient data collection, learn techniques for processing and cleaning heterogeneous datasets, and delve into advanced analytical methods to generate insights. Additionally, candidates will learn to visualize data effectively to communicate findings and drive informed decision-making. By the end of this course, candidates will have a solid understanding of the fundamental principles that underpin the data science discipline, enabling to tackle real-world challenges in the financial domain.

2. Introduction to AI for financial applications

Institute: Vienna University of Economics and Business

Teacher(s): TBD

Credits: 4EC



Course summary: This course provides a foundational understanding of artificial intelligence (AI) techniques tailored for financial applications. Candidates will begin with an introduction to machine learning (ML), covering the basics of supervised learning, unsupervised learning, and reinforcement learning, ranging from traditional techniques to contemporary neural networks. The course emphasizes practical applications in finance, such as financial forecasting, credit risk assessment, and algorithmic trading. By the end of the course, candidates will be equipped to apply AI methods to solve complex problems in the financial sector.

3. The need for eXplainable AI: methods and applications in finance

Institute: Bern University of Applied Sciences

Teacher(s): Branka Hadji Misheva

Credits: 4EC

Course summary: This course provides an introduction to Explainable Artificial Intelligence (XAI), focusing on various state-of-the-art models such as LIME, SHAP, DiCE, LRP, and counterfactual explanations, exploring their methodologies and applications. It delves into the challenges faced by classical XAI methods, including issues of scalability, interpretability, and accuracy. The course also covers advanced topics on the limitations and reliability of these models when applied to complex data sets. A special emphasis is placed on methods tailored for financial applications, addressing the specific needs and regulatory requirements unique to this sector. By the end of the course, participants will be equipped with the knowledge to implement and critically evaluate XAI approaches within financial systems.

4. Introduction to Blockchain Applications in Finance

Institute: Bucharest Academy of Economic Studies

Teacher(s): Daniel Traian Pele, Frédéric Sinan Bernard (University of Twente)

Credits: 4EC



Course summary: An Introduction to Blockchain Applications in Finance doctoral course provides an in-depth exploration of how blockchain technology can revolutionize financial industries. It covers the fundamental concepts of blockchain, including its decentralized structure, security features like cryptography, and consensus mechanisms. The course also examines specific applications of blockchain in finance such as cryptocurrencies, smart contracts, and decentralized finance (DeFi) solutions, highlighting their potential to enhance transparency and efficiency. Students learn through case studies of existing blockchain implementations in banking, insurance, and other financial sectors, analyzing both successes and challenges. Additionally, the course addresses regulatory considerations and future trends, equipping students with the knowledge to innovate and lead in the field of financial blockchain applications.

5. Sustainable Finance

Institute: University of Naples Federico II

Teacher(s): Maria Iannario

Credits: 4EC

Course summary: The course 'Sustainable Finance' aims at analysing the following topics developed through seminar modules discussed and analysed by stakeholders from the sector Brief introduction on the rapidly changing financial environment. Capital for a sustainable future. Analysis of capital flow in the financial system. Approaches to sustainable finance. Study of the relationship between risk and return and the impact on sustainable finance. Sustainable finance solutions. The role of the public sector in sustainable finance. Integrity of green finance and climate-related risks as a normalised feature of corporate decision making. Inclusion, age/gender inequality and finance.

examines specific applications of blockchain in finance such as cryptocurrencies, smart contracts, and decentralized finance (DeFi) solutions, highlighting their potential to enhance transparency and efficiency. Students learn through case studies of existing blockchain implementations in banking, insurance, and other financial sectors, analyzing



both successes and challenges. Additionally, the course addresses regulatory considerations and future trends, equipping students with the knowledge to innovate and lead in the field of financial blockchain applications.

6. Ethics applicable to digital aspects

Institute: University of Twente

Teacher(s): Ekaterina Svetlova

Credits: 4EC

Course summary: The "Ethics Applicable to Digital Aspects" course equips doctoral candidates with the knowledge and tools to navigate the ethical challenges in the digital age, particularly in the realms of artificial intelligence and digital finance. Candidates will explore the ethical implications of emerging technologies, focusing on issues such as data privacy, algorithmic bias, and the ethical use of financial technologies. The course covers essential topics like ethical decision-making frameworks, the responsible use of data, and the regulatory landscape surrounding digital finance. Candidates will learn to critically assess the societal impacts of digital innovations, balancing technological advancements with ethical considerations to protect individual rights and promote fairness. By the end of the course, candidates will be prepared to address ethical dilemmas in digital finance and technology, contributing to the development of responsible, ethical solutions that drive positive societal change.



Advanced scientific training

As part of their training, each doctoral candidate will engage in advanced scientific skills courses, focusing on technical expertise in digital finance. These courses provide in-depth knowledge and specialized skills in areas such as machine learning algorithms, blockchain technology, and data analytics, ensuring that candidates are well-prepared to tackle complex challenges in both academic research and the financial industry.

7. Synthetic Data Generation for Finance

Institute: TBD

Teacher(s): TBD

Credits: 4EC

Course summary: The course 'Synthetic Data Generation for Finance' explores the use of deep learning techniques, including Generative Adversarial Networks (GANs), to create synthetic financial data indistinguishable from real-world data. Throughout this course, doctoral candidates will learn the principles and methodologies behind synthetic data generation, focusing on techniques to replicate the patterns and statistical properties of authentic financial datasets. Candidates will explore various use cases for synthetic data in AI training, such as fraud detection, crisis simulation, and risk assessment, aimed to enhance the robustness and scalability of financial models. The course facilitates practical experience in implementing GANs and other deep learning models to generate synthetic data tailored to specific financial applications. The course develops the skills and insights to leverage synthetic data effectively in financial analysis, decision-making, and AI-driven innovations, unlocking new opportunities for experimentation and development in finance.

8. Anomaly Detection in Big Data

Institute: Babeş-Bolyai University

Teacher(s): Codruta Mare, Liana Stanca



Credits: 4EC

Course summary: 'Anomaly Detection in Big Data' is a course designed to equip doctoral candidates with the principles and techniques necessary to identify anomalies within large datasets. Throughout this course, candidates will explore various methodologies for anomaly detection, including statistical approaches, machine learning algorithms, and advanced data mining techniques. Candidates will also gain experience in handling data errors, discussing strategies such as human inspection, outlier removal, and leveraging both traditional imputation techniques and artificial intelligence to fill data gaps. Furthermore, the course teaches how to map data quality metrics to assess the reliability and integrity of financial datasets, ensuring robust anomaly detection processes. By the end of this course, candidates will possess the skills and insights needed to effectively detect and mitigate anomalies in big data environments, enabling to safeguard against financial risks and improve decision-making processes.

9. Natural Language Processing with Transformers

Institute: Athena Research Center

Teacher(s): Haris Papageorgiou

Credits: 3EC

Course summary: 'Natural Language Processing with Transformers' merges computational linguistics, role-based modeling of human language, and contemporary machine learning techniques. Throughout this course, doctoral candidates learn about the fusion of linguistic theories with statistical machine learning and deep learning models, focusing on the capabilities of transformer mechanisms and the application of modern large language models on various types of texts in the financial domain. Candidates will explore the intricacies of transformer architectures, such as BERT, GPT, and their variants, mastering their application in a wide range of advanced NLP tasks, from sentiment analysis to language generation. Additionally, candidates will gain hands-on experience in leveraging transformers for tasks like text classification, named entity recognition, and language



translation. After completing the course, candidates will be able to harness transformer-based large language models to process and generate texts in the financial domains.

10. Dependence Structures in High Frequency Financial Data

Institute: Budapest Business University

Teacher(s): TBD

Credits: 3EC

Course summary: The doctoral course "Dependence Structures in High Frequency Financial Data" focuses on sophisticated methods for detecting dependencies in financial datasets. It emphasizes the automatic detection of relationships among multiple vectors, employing advanced statistical and mathematical techniques. Key topics include identifying various patterns in data such as time-dependent trends, volatility clustering, seasonality, and the presence of fat tails. The course extensively covers the application of copulas—tools used to model and analyze the dependence between random variables—and spectral measures, which help in understanding the frequency components of dependencies. Through theoretical instruction and practical applications, students learn to analyze complex dependencies in high-frequency financial data, preparing them for research and applications in quantitative finance.

11. Reinforcement Learning in Digital Finance

Institute: University of Twente

Teacher(s): Wouter van Heeswijk, Jörg Osterrieder, Martijn Mes

Credits: 4EC

Course summary: Reinforcement Learning in Digital Finance" offers a comprehensive exploration of reinforcement learning (RL), which is a powerful framework to support sequential decision-making under uncertainty. Candidates will delve into the theoretical foundations of reinforcement learning, state-of-the-art algorithms, and practical



applications within the digital finance domain. RL can facilitate and enhance sequential decision-making processes and services in finance, such as algorithmic trading, portfolio optimization, risk management, and fraud detection. Doctoral candidates will gain a solid understanding of the theoretical underpinnings of RL as well as practical experience in implementing reinforcement learning algorithms to solve real-world financial problems. The applications will consider constraints and regulations that concern privacy, algorithmic bias, and explainability. By the end of the course, candidates will be equipped with the knowledge and skills to leverage reinforcement learning for optimizing control, enhancing performance, and improving services in the dynamic landscape of digital finance.

12. Machine Learning in Industry

Institute: Cardo AI

Teacher(s): Rubin Haxhiymeri

Credits: 4EC

Course summary: In the course "Machine Learning in Industry" doctoral candidates will explore the foundational principles of applying machine learning in real-world industrial settings in the financial domain. Throughout this course, candidates will learn about the key concepts and methodologies of machine learning, with a focus on their practical implications for businesses, as well as how to assess the potential impact of automation decisions on various aspects of business operations, including productivity, efficiency, and cost-effectiveness. Additionally, it covers topics such as the availability and costs of acquiring high-quality data, data preprocessing techniques, and strategies for managing data privacy and security concerns. By the end of this course, candidates will be equipped with the knowledge and tools needed to utilize machine learning to drive innovation, optimize business processes, and achieve strategic objectives in diverse financial industrial contexts.

13. Deep Learning for Finance

Institute: Babes-Bolyai University



Teacher(s): Liana Stanca

Credits: 3EC

Course summary: Deep Learning for Finance' delves into the cutting-edge realm of deep neural networks (DNNs) tailored specifically for financial applications. Throughout this course, doctoral candidates will learn to construct and train DNNs, exploring crucial architectural parameters such as network architecture and activation functions. Candidates will gain hands-on experience in implementing vectorized neural networks, optimizing for efficiency and scalability in financial data processing. Furthermore, you will analyze variance in deep learning applications within the financial domain, addressing challenges related to data heterogeneity, model interpretability, and algorithmic stability. By the end of this course, candidates will be equipped with the expertise to harness the power of deep learning in revolutionizing digital finance, paving the way for innovative solutions in risk assessment, portfolio management, and algorithmic trading.

14. Data-Centric AI

Institute: Vienna University of Economics and Business

Teacher(s): TBD

Credits: 3EC

Course summary: This course is designed to empower small and medium-sized enterprises (SMEs) in digital finance to effectively deploy AI with limited datasets. Candidates will learn how to construct high-quality data samples to maximize the impact of AI training and identify weak spots in data quality. The course provides practical strategies for enhancing data-centric approaches, ensuring that even small datasets can drive powerful AI solutions in financial applications. By the end of the course, candidates will be equipped to optimize data quality and implement AI systems that deliver meaningful insights and outcomes in the digital finance sector.

15. Cybersecurity in Digital Finance

Institute: University of Twente



Teacher(s): Christina Kolb, Abhishta Abhishta

Credits: 4EC

Course summary: The course 'Cybersecurity in Digital Finance' gives insights in different multiple aspects of cybersecurity. (1) Modelling and Analysis: The modelling and analysis of security threats and their effect on finances will be one part of the course. (2) Economics: The relations between cybersecurity and economics will give insights how cybersecurity threats might influence the financial situation of a company. (3) Social engineering: In addition, the aspect on human behavior in terms of unawareness according to cybersecurity will be investigated. (4) Governance and regulation: Guest speakers will talk about related regulations, for example, CRA and NIS2, within their company and 5) security tradeoffs (usability/safety) will be presented and explained to the students to provide the understanding of the research problems within companies in the setting of cybersecurity.

16. AI Design in Digital Finance

Institute: Bucharest University of Economics Studies

Teacher(s): TBD

Credits: 4EC

Course summary: The doctoral course "AI Design in Digital Finance" provides a comprehensive overview of contemporary artificial intelligence techniques used in the digital finance sector. It covers a range of AI methodologies, including machine learning, neural networks, and algorithmic trading, and their applications in enhancing financial services and products. The course places a strong emphasis on designing AI systems that are not only effective but also responsible, with explicit considerations for energy consumption, bias mitigation, explainability, and fairness. Students engage with case studies and projects that challenge them to create AI solutions that uphold ethical standards and contribute positively to the financial industry. Additionally, the course explores the regulatory and societal impacts of AI in finance, preparing students to navigate and shape the future landscape of digital finance.



17. Barriers in Digital Finance Adoption

Institute: Vienna University of Economics and Business

Teacher(s): TBD

Credits: 3EC

Course summary: This course examines the hurdles to society-wide adoption of digital finance, with a focus on the design principles needed to inclusively address the needs of all genders, minorities, and vulnerable groups. Candidates will explore the challenges posed by the fast-paced industry, competitive start-up climate, and the rapid evolution of financial technologies. The course provides insights into overcoming these barriers, enabling a more equitable and inclusive digital finance ecosystem. By the end of the course, candidates will be prepared to design and advocate for digital finance solutions that are accessible to and beneficial for all segments of society.

18. Explainable AI in Finance

Institute: Bern University of Applied Sciences

Teacher(s): Branka Hadji Misheva

Credits: 4EC

Course summary: This course segment explores the classification of AI models into white box and black box categories, emphasizing their distinctive traits and implications for transparency. It evaluates the applicability of classical XAI techniques in the finance sector, discussing how these methods can be adapted to meet the stringent accuracy and explainability demands of financial regulators. Additionally, the course addresses the importance of audience-dependent explanations, highlighting how the presentation and complexity of XAI outputs should vary based on the stakeholders' technical understanding. Emerging XAI techniques are also introduced, focusing on the latest advancements and how they are set to revolutionize the interpretability of complex AI systems.



19. Digital Finance Regulation

Institute: European Central Bank

Teacher(s): TBD

Credits: 3EC

Course summary: Digital Finance Regulation' is a comprehensive course designed to provide doctoral candidates with an in-depth understanding of the regulatory landscape governing the rapidly evolving field of digital finance. Candidates will explore the regulatory frameworks that shape digital finance operations, covering key areas such as payments, cryptocurrencies, fintech innovation, and consumer protection. Candidates will gain insights into pending changes in EU regulations, including directives, guidelines, and initiatives aimed at fostering innovation while ensuring financial stability and consumer safety. The course will discuss emerging directions and focus points in digital finance regulation, including regulatory sandboxes, cross-border cooperation, and sustainability considerations. Furthermore, candidates will learn best practices for compliance and monitoring, including risk assessment, governance structures, and regulatory reporting requirements. By the end of this course, candidates will be equipped with the knowledge and tools to navigate the complex regulatory landscape of digital finance, enabling them to ensure compliance, mitigate risks, and seize opportunities in this rapidly evolving industry.

20. History and Prospects of Digital Finance

Institute: University of Naples Federico II

Teacher(s): Ekaterina Svetlova (University of Twente)

Credits: 3EC

Course summary: The course "History and prospects of digital finance" will provide doctoral candidates with an understanding of innovation in financial markets and how this relates to the adoption and use of digital technologies. While analyzing key transformative moments in global financial markets such as digitalization of stock exchanges, rise of algorithmic trading and dark pools, Flash Crash in 2010, and increasing application of



machine learning in finance, candidates will learn to understand the operational and strategic reasons for the adoptions of particular market technologies and innovations and the management and implementation issues involved in the introduction and exploitation of key innovations. Moreover, after completing the course, candidates will be able to recognize the potential and risks to financial markets participants from new market innovations and technologies. They will be equipped to participate in the development and adoption of financial innovations in future professional settings with market operating entities, financial organizations, financial technology vendors and consultancies, and national or international regulatory bodies.

21. Green Digital Finance

Institute: Kaunas University of Technology

Teacher(s): Audrius Kabasinskas, Kristina Štutienė

Credits: 3EC

Course summary: The course on "Green Digital Finance" offers a comprehensive exploration of how digital technologies are change understanding of finance. Participants will discover the theoretical foundations, state-of-the-art tools, and practical applications within the realm of green digital finance. We will uncover how digital innovations can facilitate and enhance various aspects of sustainable finance, including green investment analysis, impact assessment, risk management, and regulatory compliance. Throughout the course, participants will gain a solid understanding of the theoretical underpinnings of green digital finance, coupled with hands-on experience in implementing digital tools and technologies to address real-world environmental challenges. Moreover, participants will examine the ethical considerations and regulatory frameworks surrounding green digital finance. By the conclusion of the course, participants will be equipped with the knowledge and skills to leverage digital innovations effectively for optimizing sustainability, enhancing financial performance, and driving positive environmental impact in the dynamic landscape of green finance.



22. Multi-Criteria Decision Making in Sustainable Finance

Institute: Fraunhofer Institute

Teacher(s): Pascal Halfmann

Credits: 3EC

Course summary: The course 'Multi-Criteria Decision Making in Sustainable Finance' explores the principles and methodologies for integrating multiple objectives in decision-making processes aligned with Environmental, Social, and Governance (ESG) principles that are increasingly prevalent in finance. Throughout this course, doctoral candidates will delve into various techniques and concepts, including fuzzy set theory, the Analytical Hierarchy Process (AHP), and preference modeling, to facilitate decision-making in the complex domain of sustainable finance. Candidates will learn to effectively incorporate ESG criteria into decision models, balancing competing objectives while considering the impact on environmental sustainability, social equity, and corporate governance. Additionally, the course will discuss real-world applications and case studies, enabling candidates to apply learned techniques to address contemporary challenges in sustainable finance. The course equips candidates with the knowledge and tools to make informed and ethically responsible decisions that contribute to long-term sustainability and societal well-being.



Transferable skills courses

As part of their training, each doctoral candidate will participate in courses on transferable skills, covering areas such as communication, project management, and leadership. These courses are designed to equip candidates with essential skills that are valuable across various professional settings, ensuring they are well-prepared to thrive in both academic and industry roles upon completing their doctoral journey.

23. Gender and Diversity Dimension in Research

Institute: European Central Bank

Teacher(s): TBD

Credits: 2EC

Course summary: The PhD course "Gender and Diversity Dimensions in Research" explores the intersectionality of gender, diversity, and technological advancements in financial systems. Doctoral candidates will study how gender and diverse perspectives influence financial technology innovation, adoption, and outcomes. The course examines the impact of digital finance on various demographic groups, including women, minorities, and marginalized communities, shedding light on both opportunities and challenges. Through applying taught research methodologies in digital finance case studies, candidates will analyze the role of inclusivity in shaping digital financial services and their implications for societal equity and economic development. Ultimately, the course equips scholars with the analytical tools and insights necessary to drive inclusive digital finance policies and practices.

24. Project Management

Institute: Royalton Partners

Teacher(s): TBD

Credits: 1EC



Course summary: Project Management' is a course that teaches the foundational principles and practices necessary for effective project leadership. Throughout this course, doctoral candidates will learn about key concepts and methodologies essential for successful project management in the financial domain, addressing the full project lifecycle from initiation to completion and evaluation. Candidates will learn how to navigate project lifecycles, develop comprehensive project plans, and execute strategies for efficient resource allocation and task delegation. Additionally, the course will explore various techniques for handling common challenges in project management, including risk mitigation, stakeholder communication, and quality assurance. By the end of this course, candidates will be equipped with the knowledge and skills to lead projects, ensuring timely delivery, compliance with budget constraints, and the satisfaction of stakeholders.

25. HE framework and research project management

Institute: The Bucharest University of Economic Studies

Teacher(s): TBD

Credits: 1EC

Course summary: The "HE Framework and Research Project Management" course is designed to equip doctoral students with the skills necessary to effectively manage research projects within the higher education (HE) framework. It introduces students to the foundational principles of project management, including planning, execution, monitoring, and closure, specifically tailored to the academic research environment. The course emphasizes the importance of aligning research projects with institutional goals, securing funding, and managing resources efficiently. Additionally, students learn about the ethical considerations and regulatory compliance required in conducting scholarly research. Through practical exercises and case studies, students develop competencies in navigating the complexities of academic research management, enhancing their ability to lead and deliver successful research projects in the HE sector.

26. Research Ethics and Sustainable Research Management

Institute: Bern University of Applied Science



Teacher(s): TBD

Credits: 1EC

Course summary: This course offers an in-depth exploration of research ethics, focusing on the principles and standards that govern the conduct of ethical research across various disciplines. It addresses key issues such as informed consent, confidentiality, and the ethical treatment of research subjects. The course also delves into sustainable research management, teaching strategies for efficient resource utilization and long-term project sustainability within academic and professional settings. Participants will learn about the importance of ethical publication practices and the avoidance of misconduct such as plagiarism and data falsification. Through a combination of case studies and real-world examples, the course aims to equip researchers with the skills needed to uphold ethical standards and promote sustainability in their research endeavors.

27. Environmental Aspects

Institute: University of Naples Federico II

Teacher(s): Polina Khrennikova (University of Twente)

Credits: 1EC

Course summary: The course 'Environmental Aspects' explores the intersection of environmental issues and finance, focusing on how sustainability and environmental risks impact corporate finance and investment strategies. Students will learn to assess the financial implications of environmental issues, evaluate ESG criteria, and understand regulatory impacts on financial decisions. The course will provide doctoral candidates with an understanding of sustainable investing, impact investing, and the role of digital finance innovations in this field.

28. Scientific Writing

Institute: Bern University of Applied Sciences

Teacher(s): TBD



Credits: 1EC

Course summary: This course on Scientific Writing is designed to enhance the skills necessary for effective communication in the scientific community. It covers the fundamentals of structuring scientific papers, including how to write clear and concise abstracts, compelling introductions, methodical methods sections, and insightful discussions. The course emphasizes the importance of clarity and precision in language, ensuring that complex scientific ideas are conveyed with accuracy and simplicity. Participants will learn the art of crafting persuasive arguments and supporting them with robust data and logical reasoning. By the end of the course, attendees will be adept at writing high-quality scientific manuscripts that are suitable for publication in reputable journals.

29. Scientific Communication

Institute: Raiffeisen Bank International AG

Teacher(s): TBD

Credits: 1EC

Course summary: In the course 'Scientific Communication', doctoral candidates will learn to effectively convey scientific findings to diverse audiences. The course explores the principles and best practices of scientific communication, presentation skills, and effective communication strategies targeted to various audiences. In terms of written communication, candidates will develop proficiency in crafting clear, concise, and engaging scientific texts, research proposals, and technical reports. The nuances of oral communication with different types of stakeholders will be addressed as well, enhancing the skills to deliver compelling presentations, lectures, and conference talks. Furthermore, candidates will learn how to leverage visual aids, storytelling techniques, and digital media to enhance the impact of scientific communication efforts. By the end of this course, candidates will be equipped with the tools and techniques to communicate research findings effectively, fostering collaboration, knowledge dissemination, and societal impact.



30. Open Science Principles

Institute: University of Naples Federico II

Teacher(s): Domenico Ciounzo

Credits: 1EC

Course summary: The course 'Open Science' represents a new approach to the scientific process based on cooperative work and new ways of diffusing knowledge by using digital technologies and new collaborative tools. Candidates will delve into the definition of this umbrella concept, including its historical perspective and its fundamental core concepts, such as open data and open collaboration. Doctoral candidates will gain a solid understanding of how to integrate the principles of openness throughout the research process, emphasizing early sharing and teamwork. This shift in approach represents a transformative change in the way science is conducted. The applications will explore research examples from the digital finance domain to see these ideas in action. By the end of the course, candidates will be equipped with the knowledge and skills to design and execute research projects from beginning to the end, all within the framework of openness.

31. Citizen Science

Institute: Vienna University of Economics and Business

Teacher(s): TBD

Credits: 1EC

Course summary: This course explores the role of citizen science in the digital finance sector, empowering individuals and communities to actively participate in financial research and innovation. Candidates will learn how to actively include citizens into their research, leveraging digital tools and platforms to crowdsource data, analyze financial trends, and contribute to the development of more inclusive and transparent financial systems. The course emphasizes the collaborative potential of citizen science to address real-world challenges in digital finance, fostering a deeper understanding of and engagement with financial technologies among the public.



32. Intellectual Property Rights and Patenting

Institute: European Central Bank

Teacher(s): TBD

Credits: 1EC

Course summary: Intellectual Property Rights and Patenting' facilitates a comprehensive understanding of the principles, laws, and practices surrounding intellectual property (IP) protection and patenting. Throughout this course, doctoral candidates will explore the fundamentals of IP rights, including patents, trademarks, copyrights, and trade secrets, focused on applications in the financial domain. The course teaches how to navigate the legal landscape of IP, assessing the criteria for patentability, the process of patent application, and strategies for enforcing and defending IP rights. Candidates will be immersed in the economic, ethical, and strategic implications of IP protection, exploring their role in fostering innovation, promoting competition, and facilitating technology transfer. By the end of this course, candidates will possess the knowledge and skills to effectively navigate the complexities of IP rights and patenting, enabling to protect and leverage intellectual assets in the knowledge-driven digital finance domain.

33. Entrepreneurship Training

Institute: EIT Digital

Teacher(s): TBD

Credits: 1EC

Course summary: Entrepreneurship Training' cultivates the skills, mindset, and strategies essential to increase the odds of success in financial entrepreneurship. Throughout this course, doctoral candidates will explore the fundamentals of entrepreneurship, from ideation to venture creation, growth, and maturity. Candidates will learn how to identify opportunities, assess market viability, and develop innovative business models that address real-world needs. The course addresses topics such as business planning, financial management, marketing, and sales, offering the tools and frameworks to



effectively launch and scale new ventures. Moreover, the course develops insights into the entrepreneurial mindset, resilience, and leadership qualities necessary to navigate challenges, uncertainty, and opportunities in the competitive landscape of digital finance. 'Entrepreneurship Training' develops entrepreneurial potential, enabling candidates to drive meaningful impact and contribute to positive change in society through entrepreneurship.

34. Entrepreneurial Finance

Institute: Bern University of Applied Science

Teacher(s): TBD

Credits: 1EC

Course summary: 'Entrepreneurial Finance' is a course designed to equip doctoral candidates with the essential skills and strategies needed to excel in the realm of financial entrepreneurship. Through a curriculum covering key topics such as financial modeling, valuation, and capital raising, participants will gain the knowledge and confidence to navigate the complexities of entrepreneurial ventures. By fostering an entrepreneurial mindset and leadership qualities, this course enables participants to drive meaningful impact and contribute to positive change in the world of finance.

35. Start-ups and Industry Transfer

Institute: EIT Digital

Teacher(s): TBD

Credits: 1EC

Course summary: The "Start-ups and Industry Transfer" course allows doctoral candidates to explore the dynamic intersection between academic research, entrepreneurship, and industry collaboration. Throughout this course, candidates will be informed on the process of transforming research insights into viable start-up ventures and facilitating the transfer of innovative technologies to the commercial sphere. Candidates will examine case studies of



successful start-ups born from academic research and explore strategies for navigating the challenges and opportunities of industry transfer. Additionally, the course will cover topics such as intellectual property management, technology licensing, funding mechanisms, and strategic partnerships, providing candidates with the tools and knowledge needed to translate research innovations into real-world impact. By the end of this course, candidates will be equipped with the entrepreneurial mindset and practical skills necessary to drive innovation, create value, and foster collaboration between academia and industry.

36. Labor Market Skills

Institute: University of Twente

Teacher(s): Frédéric Sinan Bernard

Credits: 1EC

Course summary: In the 'Labor Market Skills' course, doctoral candidates will explore the skills and competencies required to succeed in today's dynamic and competitive labor market. The course addresses a comprehensive range of topics aimed at enhancing employability and career prospects. Topics covered include communication skills, problem-solving abilities, teamwork, adaptability, and digital literacy, among others. Candidates will also learn how to effectively leverage their academic background and research experience to meet the demands of various industries (both finance and beyond) and professions. Additionally, the course will provide practical guidance on resume writing, job searching strategies, interviewing techniques, and networking skills, empowering candidates to navigate the job market with confidence and professionalism. Candidates will obtain the skills, knowledge, and mindset needed to thrive in their chosen career paths and make meaningful contributions to the knowledge workforce.

37. Job Applications

Institute: University of Twente

Teacher(s): Marcos Machado



Credits: 1EC

Course summary: Job Applications' is a tailored course designed to equip participants with essential skills for pursuing careers in both industry and academia. Through interactive workshops and practical exercises, candidates will learn effective strategies for crafting compelling resumes, cover letters, and job applications tailored to diverse professional settings. The course will also provide guidance on navigating the job market, networking effectively, mastering interviews, and showcasing their research and transferable skills to prospective employers. By the end of the course, participants will be well-prepared to pursue exciting opportunities in various sectors, leveraging their unique experiences and expertise gained from the Marie Curie program.

38. Communication Skills

Institute: University of Twente

Teacher(s): Renata Guizzardi, Xiaohong Huang

Credits: 1EC

Course summary: 'Communication Skills' teaches candidates to communicate effectively with a diverse range of target audiences. Striving for effective communication is a must in today's society, being it in the workplace to advertise services and products, being it in the academic environment. However, practitioners and researchers are often not properly trained in communication and thus do not develop the proper communication skills. This reflects in the media practitioners and researchers choose to communicate their achievements, the level of knowledge they assume from the audience and ultimately, the way they communicate their achievements. In this course, candidates will learn to apply communication science in their routine activities, being taught how to write and speak effectively, and tailor communication to the needs of the target audience. Candidates will work on a tailored strategy to communicate their product/service or research, taking their communications goals and key stakeholders into consideration.



Secondments

As part of their training, each doctoral candidate within the MSCA network will undertake two extended placements with governmental and industrial partners. These immersive experiences ensure that candidates engage with real-world challenges, gaining practical skills and insights that will prepare them to excel in both academia and industry upon completing their doctoral journey.