MASTER MINDS M1 2025-2026 INSA LYON

SEMESTER	THEME	UE CODE	UE	SEMESTRIAL UE CREDITS	EC CREDITS	EC CODE	TUTORS	EC TITLE	CONTENT / SYLLABUS	Tutored hours	
										sem 1	sem2
1	FUNDAMENTALS OF DATA SCIENCE & DATA ENGINEERING	MINDS-1-S1-UE-DS	Data Sciences & Data Engineering Foundations I	7	3	MINDS-1-S1-EC-IDS	Riccardo Tomassini	Introduction to Data Sciences and foundations of data engineering	This course provides an introduction to data science and data engineering fundamentals, covering data handling, storage, and analysis. Students will learn essential data preprocessing, explore data visualization, and understand basic machine learning concepts. Key topics include data pipelines, Practical exercises and a final project will give hands-on experience in data engineering workflows and data-driven problem-solving.	48	
					2	MINDS-1-S1-EC-SP	Diana Nurbakova	Statistics and Probabilities – Basics I	Linear Algebra (vectors, matrices, decompositions), Basic Probability and Statistics (distributions, expectation, variance), Algorithmic Complexity Concepts. Labs with Python notebooks.	32	
					2	MINDS-1-S1-EC-ML-I	Stefan Duffner	Machine Learning - Basics I	Introduction to Machine Learning, PAC learning, Complexity-Bias trade-off and generalisation, VC dimension, Regression, Classification, SVM, Convexity, Regularisation, Stochastic Gradient Descent, Introduction to Python for Machine Learning	32	
2		MINDS-1-S2-UE-DS	Data Sciences & Data Engineering Foundations II	4	4	MINDS-1-S2-EC-ML-II	Elöd Egyed-Zsigmond Julien Velcin	Machine learning - Basics II	Text mining, NLP, sequence models, recurrent neural networks, transformers		48
1		MINDS-1-S1-UE-DA	Distributed Algorithms & Systems I	4	2	MINDS-1-S1-EC-DADS	Sonia Ben Mokthar	Fundamentals on Distributed Algorithms and Distributed Systems	Introduction to Distributed Systems, Communication in Distributed Systems, Synchronization and Coordination, Consistency Models and Data Replication, Fault Tolerance and Reliability, Introduction to Distributed Algorithms	32	
					2	MINDS-1-S1-EC-BKC	Omar Hasan	Introduction to Blockchain and distributed ledger technologies	Blockchain Fundamentals, Distributed Ledger Concepts, Consensus Mechanisms, Smart Contracts, Applications of Blockchain	32	
2		MINDS-1-S2-UE-DA	Distributed Algorithms & Systems II	3	3	MINDS-1-S2-EC-FLDS	Sara Bouchenak	Federated Learning for Distributed Systems: Foundations, Privacy, And Decentralized Applications	Foundations of Federated Learning, Privacy and Data Security in Distributed Systems, Decentralized Applications and Use Cases, Challenges and Solutions in Federated Learning, Implementing Federated Learning Models		32
1	FOUNDATIONS OF CYBERSECURITY	MINDS-1-S1-UE-CYBER	Fundamentals on Cybersecurity I	5	2	MINDS-1-S1-EC-CRYP	Omar Hasan	Cryptography for cybersecurity	Introduction to cryptographic principles and techniques. Applications of cryptography for data protection and secure communications.	24	
					3	MINDS-1-S1-EC-PRIV	Antoine Boutet	Foundations on privacy	Overview of data privacy laws and regulations. Techniques for ensuring privacy in digital systems and compliance with regulations.	32	
2		MINDS-1-S2-UE-CYBER	Fundamentals on Cybersecurity II	5	3	MINDS-1-S2-EC-SECUR	Lionel Brunie	Cybersecurity: enforcement architectures	Design and implementation of secure architectures for threat mitigation. Case studies on architecture enforcement in various industries.		32
					2	MINDS-1-S2-EC-RISK	Lionel Brunie	Cybersecurity: risk assessment and methodological tools	Methods for identifying and assessing security risks. Tools and frameworks for cybersecurity risk management.		24
1	COMPUTER VISION & ROBOTICS	MINDS-1-S1-UE-CVROB	Fundamentals on Computer Vision I	5	2	MINDS-1-S1-EC-IMGP	Razmig Kéchichian	Fundamentals on Image Processing	Introduction to digital image and video processing: image representations (spatial and spectral), filtering, analysis, image and video compression, with image processing lab sessions.	24	
					3	MINDS-1-S1-EC-IMAN	Véronique Eglin Stéphane Bres	Fundamentals on Image Analysis	Key methods in feature extraction and object detection. Real-world applications such as scene recognition and document recognition. Introduction au ML pour la vision	32	
2		MINDS-1-S2-UE-CVROB	Fundamentals on Computer Vision II	5	3	MINDS-1-S2-EC-MLCV	Razmig Kéchichian	Fundamentals on machine learning for Computer Vision	Introduction to deep learning applied to image analysis (classification, object detection and segmentation) and synthesis (auto-encoders, variational auto-encoders and diffusion models), with Python labs for every theme and a classification challenge mini-project.		32
					2	MINDS-1-S2-EC-ROB	Olivier Simonin Laetitia Matignon	Fundamentals on Robotics	Basics of robot kinematics, planning and decision-making. Reinforcement Learning for robotics. Practical insights into sensors, mobile robots, and robotic simulation.		32
1	HUMANITIES & DIGITAL SOCIETY	MINDS-1-S1-UE-SOC	Fundamentals on Digital Society I	3	2	MINDS-1-S1-EC-RSE	Yannis Martin, Simon Lahner, Arturo Guizar, Benoît Loeillet	Environmental and societal challenges of AI, Ethics for AI, Frugality & eco-responsibility	Digital culture, data governance and ethics. Exploration of AI's environmental impact and ethical considerations. Sustainable and frugal AI approaches with a focus on eco-responsibility.	24	
					1	MINDS-1-S1-EC-HUL	Elisabeth Aumeunier	Language 1 or French as a Foreign Language (FLE).	Development of basic conversational skills and cultural understanding. Focus on language structure, vocabulary, and daily communication.	20	
2		MINDS-1-S2-UE-SOC	Fundamentals on Digital Society II	1	1	MINDS-1-S2-EC-HUL	Elisabeth Aumeunier	Language 2 or French as a Foreign Language (FLE).	Further language skills building, focusing on conversation and grammar. Practical applications in professional and social contexts.		20
2	ENTERPRENEURSHIP	MINDS-1-S2-UE-EIP	Entrepreneurship & Innovation Program	2	2	MINDS-1-S2-EC-EIP	Victor Pacaud, Arthur Richert	Entrepreneurial mindset and deeptech innovation	Introduction to entrepreneurial skills and innovation strategies (business models, fugality). Exploration of deeptech ventures, startup creation (agility, design thinking, lean startup, intellectual property), and funding.		20
2	INDUSTRY PROJECT CHALLENGE	MINDS-1-S2-UE-CHAL	Collective Challenges	4	4	MINDS-1-S2-EC-CC	Véronique Eglin	Collective work and challenges	Team-based challenge project focused on collaborative problem-solving requiring skills in machine and data analysis, communication, project management, and interdisciplinary teamwork.		16
1	CAPSTONE PROJECT	MINDS-1-S1-UE-CAP	Capstone Project I	6	6	MINDS-1-S1-EC-CP	Razmig Kéchichian	Individual project	Year-long individual project elaborated progressively under the supervision of a faculty member or an industrial partner. The topic falls within one of the themes of the curriculum (data science & engineering, cybersecurity, computer vision & robotics) with a focus on innovation, collaboration and presentation of results, without neglecting sustainability and ethical considerations.	8	
2		MINDS-1-S2-UE-CAP	Capstone Project II	6	6	MINDS-1-S2-EC-CP					8