University of Applied Sciences and Arts of Southern Switzerland

SUPSI

msfi competence centre sustainable mobility and railways innovation

Certificate of Advanced Studies SUPSI in Mobility Advanced Technologies

An integrated approach for the next generation of mobility professionals

With the support of

SBB CFF FFS

SWISSRAIL Industry Association

The Certificate of Advanced Studies SUPSI in Mobility Advanced Technologies (MAT)

MAT is part of the RSM MAS Program.

Is your own personal car an independent travel mean? Could an efficient public transportation system be the solution for a sustainable development? Will the autonomous drive reduce congestions and pollution? Will the interconnected transportation systems increase efficiency and reduce emissions?

The mobility sector is experiencing a disruptive phase and technologies such as A.I., big data analytics, blockchain, active sensing systems and autonomous drive are becoming essential building blocks in the development of new mobility systems.

New innovative thinking, unconventional approaches and creative solutions are needed to address the traffic problems and today's environment distress.

Therefore, preparing the next generation of leaders and technical experts for the transportation system is becoming one central aspect of a booming economy.

With MAT the attendees will not only innovate but also shape the future in a sustainable way.

An investment of 7 extended weekends

RSM, exploring mobility.

CAS Mobility Advanced Technologies

Code

RSM-MAT

Introduction

The focus of this CAS is to prepare the participants to be able to cope with the challenges of the transportation of the future. It will address specific future mobility topics in both goods and passenger transport fields in the public and private sectors. With an industry minded approach, this course, will cover subject matters such as digitalization, A.I., transformation and innovation related to mobility.

This CAS is included into the MAS Railways and Sustainable Mobility (RSM). It trains both technical and management leaders, seeking a career in the transportation industry or in the public/private sectors of mobility & transportation. The participants acquire the skills needed in departments such as research and development, production, consultancy and public institutions. They will also acquire the knowledge for managing complex interdisciplinary projects.

Attendees are going to study mobility and advanced technologies correlated to transportation in a wide context. They will learn about the latest trend technologies, how to innovate in a sustainable way, how to identify and adapt transportation systems to customer requirements. Furthermore, the ultimate travel possibilities will be analyzed (e.g. autonomous drive). This pioneering course will allow the participants to be at ease in every situation. It will not matter if the subjects are of technical, entrepreneurship or strategic nature, the attendants will have the knowledgeable and reliable counterpart.

Objectives

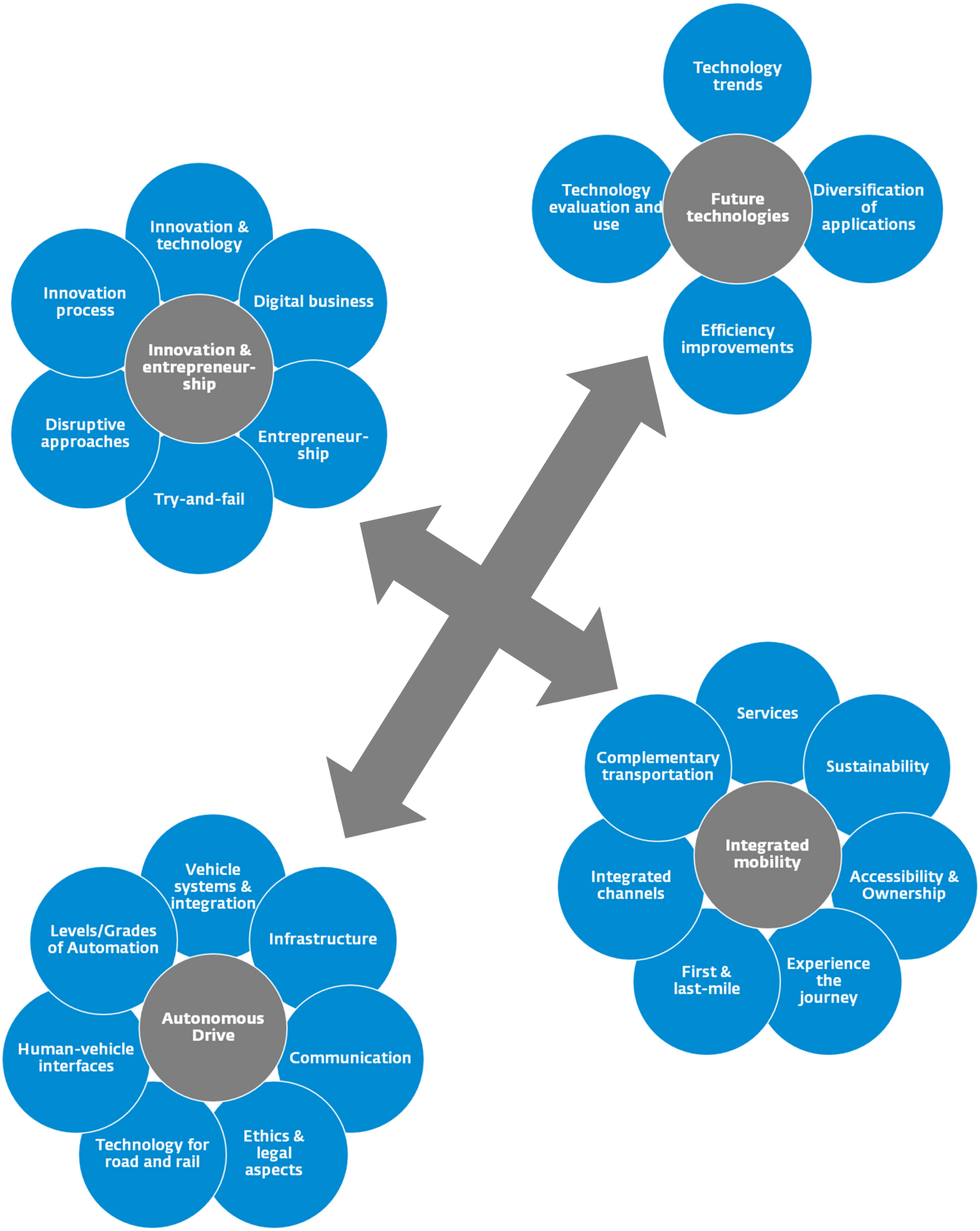
- Understand the fundamentals and the basic parameters of the overall transport system
- Comprehend mobility as an interconnected system
- Know and understand how to correctly apply new technology to the mobility sector
- Be capable of developing innovative products and services with entrepreneurship flair
- Be capable of developing and implement new integrated and sustainable transport solutions
- Understand the environmental impacts of mobility and implement mitigating actions
- Describe autonomous drive (AD) systems and concepts
- Implement AD projects in a real-life environment

Intended Audience

This CAS is devised for engineers, managers, entrepreneurs and experienced employees from the mobility sector as well as to professionals interested to work in this sector through the acquisition of the knowhow provided by this course.

Training applications

- Talent development training program
- Internal employee re-qualification or certification
- Introduction program for new hired staff
- Experienced employee cross-qualification
- Independent professional certification
- Strategy development training


Innovation & technology
Innovation process
Digital business
Innovation & entrepreneur-ship
Disruptive approaches
Entrepreneur-ship
Try-and-fail
Technology trends
Technology evaluation and use
Future technologies
Diversification of applications
Efficiency improvements
Services
Complementary transportation
Sustainability
Integrated mobility
Integrated channels
Accessibility & Ownership
First & last-mile
Experience the journey
Vehicle systems & integration
Levels/Grades of Automation
Infrastructure
Autonomous Drive
Human-vehicle interfaces
Communication
Technology for road and rail
Ethics & legal aspects

Practical relevance

The MAT CAS has a practical approach. The attendees will be actively involved in the innovation process and technological changes our society is experiencing, being encouraged to bring their own examples and ideas to the discussion and focus on innovative solutions and approaches on mobility problems issued from selected manufacturer and national (or international) operators. They will then be able to make a seamless transition to the world of work, familiarized with the challenges stemming from the different industry-based examples.

Skills

Industrialist, entrepreneur, innovator

- Understand and apply a new concept of disruptive innovation and acquire new knowledge on how to identify potential breakthrough applications.

OneMobility

- Correctly define, understand and work on the mobility system as one interconnected environment.

Technologize

- Identify and apply new trends, cross-industry technologies and long-term tendencies to the mobility sector.

Try-and-fail

- Understand and learn why innovation projects fail and then tackle it with a refreshed and knowledgeable mind.

Self-driving equipment and infrastructure

- Acquire all necessary skills on Autonomous Drive in order to be able to manage and successfully implement an AD-project in a real environment.

Requirements

Bachelor Graduates from Engineering Programs, Management or other Technical and Scientific faculties. Non-graduates Professionals and Managers from the Railways and Mobility fields with at least 3 years of experience with a presentation of a complete Dossier. The Master is held in English (lessons and documentations) therefore good command of English is required.

Certificate

Certificate of Advanced Studies SUPSI in Mobility Advanced Technologies
Credits: 11 ECTS

Mandatory 2-day practical experience

Students shall choose two of the following experiences:
Train conductor - (Chef Kundenbegleiter, chef de train, capo treno)
Train driver - (Lokführer, conducteur de trains, macchinista)
Traffic engineer - (Verkehrsingenieur, ingénieur des transports, ingegnere del traffico)
Train controller - (Zugverkehrsleiter, chef circulation des trains, responsabile circolazione treni)
Client advisor - (Kundenberatung, conseiller clientèle, consulente della clientela)
Transport police - (Transportpolizei, police des transports, polizia dei trasporti)
AD Project Experience - (Autonomous Drive)
Vehicle hand-on – (Unterhalt und Service, entretien et service, manutenzione e servizio)
Credits: no credits

Program

1	**Module**	**Innovation & entrepreneurship**	**INE**
	Lecturer	SUPSI Lecturer and/or Industry Expert	
	Lessons	24 hours (2 ETCS)	
	Contents	› Innovation & technology: technological change; cultural approach; governance; micro/macro innovation levels; cross-functional collaboration; organization; strategy. › Digital business: conventional vs. digital; information representation; automation; processes; industry 2025 (4.0); mobility industrial applicability; industrial internet of things (IIoT, IoT); big data. › Entrepreneurship: from the idea to the design and launch of a new business; exploration vs. exploitation; business & financing models; crowdsourcing; legal aspects; commercialization. › Try-and-fail: lesson learned; failure analysis; sharing experiences; repetitive failure; profit from failure. › Disruptive approaches: new markets; value network; new entrants; risk association; market penetration. › Innovation process: idea, invention, innovation; creative approach; guidelines; iterative process.	
2	**Module**	**Integrated mobility**	**IMO**
	Lecturer	Simone Bernasconi, Managing Director msfi	
	Lessons	24 hours (2 ETCS)	
	Contents	› Services: mobility; complementary; integration of different transport services; ancillary services. › Sustainability: new mobility; e-mobility; $H_2(O)$-mobility; shared, pooled, individual mobility. › Ownership and accessibility: concepts, costs analysis, mission and economics; mobility as service. › Experience the journey: mobility as an experience; productivity on route; freedom of choice; quality of service. › First and last-mile: cooperation between operators; common platforms; flexibility of transport system; sustainable and efficient journey. › Integrated Channels: mobile ticketing; automatic CI-CO; coordinate timetables › Complementary transportation: from air to rail; from rail to road; from road to walk.	
3	**Module:**	**Future technologies ***	**FUT**
	Lecturer	SUPSI Lecturer and Industry Expert	
	Lessons	36 hours (3 ETCS)	
	Contents	› Technology trends: emerging technologies; predictions; future business requirements; history developments, hypes vs. coherence. Technologies such as A.I., big data analytics, blockchain, active sensing systems. › Diversification of applications: application of new technologies derived from other industries; use of processes/procedures/innovations established in related sectors. › Technology evaluation and use: estimate a technology potential, commercial application of ideas, evaluation models, technology application in real life. › Efficiency improvements: innovations that help sustainable development and productivity.	
		* Contents will be updated on a yearly basis to cope with the technology development pace and innovation rhythm.	

Program (cont.)

4	Module	Autonomous Drive	ADR
	Lecturer	Industry Expert	
	Lessons	48 hours (4 ETCS)	
	Contents	› Vehicle systems and integration: components & systems; redundancy; reliability; security & safety. › Infrastructure: requirements; support functions; supervision; ground structure; conflicts; data storage; IT security. › Networks & communication: standards; protocols; interconnections; platforms; tools; standardizations; IT security. › Human-Vehicle interfaces: information exchange; visual and acoustic aids; intuitiveness; interactions; external influence. › Basics of Artificial Intelligence (A.I.) & data science: decision making; reliability; data processing; algorithms. › Technology for road and rail: differences and commonalities; basic structures; examples of application; requirements and investments. › Levels/grades of automation (L1 to L5): Study of the various grades of automation, mainly in the automotive and railway sectors.	

Dates

Innovation & entrepreneurship (**INE**)
15 March 2019, 12 April 2019, 25 May 2019
Integrated mobility (**IMO**)
30 March 2019, 13 April 2019, 25 May 2019
Future technologies (**FUT**)
16 March 2019, 29 March 2019, 24 May 2019, 5 July 2019
Autonomous Drive (**ADR**)
10 May 2019, 11 May 2019, 7 June 2019, 8 June 2019, 6 July 2019

School Time

Friday 09:30 – 18:30
Saturday 09:30 – 18:30

Weekly block classes at company selected location available upon request (1 ON, 1, 2 or 3 OFF).
All RSM courses can be offered as a continuous 4 days for 4 weeks “Summer School” or “Block” class.

Method support

E-learning classes can be proposed by the lecturer (max 15%), skype attendance accepted (max. 10%)

Schedule

MAT				2019 Mar 15 Fri	2019 Mar 16 Sat	2019 Mar 29 Fri	2019 Mar 30 Sat	2019 Apr 12 Fri	2019 Apr 13 Sat	2019 May 10 Fri	2019 May 11 Sat	2019 May 24 Fri	2019 May 25 Sat	2019 Jun 07 Fri	2019 Jun 08 Sat	2019 Jul 05 Fri	2019 Jul 06 Sat
C	#	Start	Finish														
Mobility Advanced Technologies	1	07:45	08:30														
	2	08:30	09:15														
	X	09:15	09:30														
	3	09:30	10:15	INE	FUT	FUT	IMO	INE	IMO	ADR	ADR	FUT	INE	ADR	ADR	FUT	ADR
	4	10:15	11:00	INE	FUT	FUT	IMO	INE	IMO	ADR	ADR	FUT	INE	ADR	ADR	FUT	ADR
	X	11:00	11:15														
	5	11:15	12:00	INE	FUT	FUT	IMO	INE	IMO	ADR	ADR	FUT	INE	ADR	ADR	FUT	ADR
	6	12:00	12:45	INE	FUT	FUT	IMO	INE	IMO	ADR	ADR	FUT	INE	ADR	ADR	FUT	ADR
	L	12:45	13:30														
	7	13:30	14:15	INE	FUT	FUT	IMO	INE	IMO	ADR	ADR	FUT	IMO	ADR	ADR	FUT	ADR
	8	14:15	15:00	INE	FUT	FUT	IMO	INE	IMO	ADR	ADR	FUT	IMO	ADR	ADR	FUT	ADR
	X	15:00	15:15														
	9	15:15	16:00	INE	FUT	FUT	IMO	INE	IMO	ADR	ADR	FUT	IMO	ADR	ADR	FUT	ADR
	10	16:00	16:45	INE	FUT	FUT	IMO	INE	IMO	ADR	ADR	FUT	IMO	ADR	ADR	FUT	ADR
	X	16:45	17:00														
	11	17:00	17:45	INE		FUT	IMO	INE	IMO	ADR	ADR	FUT		ADR	ADR		
	12	17:45	18:30	INE		FUT	IMO	INE	IMO	ADR	ADR	FUT		ADR	ADR		
	X	18:30	18:45														
	13	18:45	19:30														
	14	19:30	20:15														

Duration: 132 hour-lesson

Responsible: Simone Bernasconi

Enrolment

Until **March 7, 2019**. Applications/enrolments possible at any time previous agreement with the course responsible.

Place: At the "Officine FFS" in Bellinzona (5 minutes walking from the station).

Lectures

Tuition and documentation will be in English, but we can assist the students in Italian and German. If you wish to attend the course in another language, please mention it during registration and select between Italian and German. The Course could be held in another language if there were at least 8-10 participants.

Cost

CHF 6'100.–

For those who already have attended a CAS of the MAS – RSM, the cost is: 5'700 CHF with a further reduction of 10%. These costs include the exam at the end of the course, the certificate and the documentation. Companies with more than three (3) enrolled participants will be granted a special discount.

In cooperation with

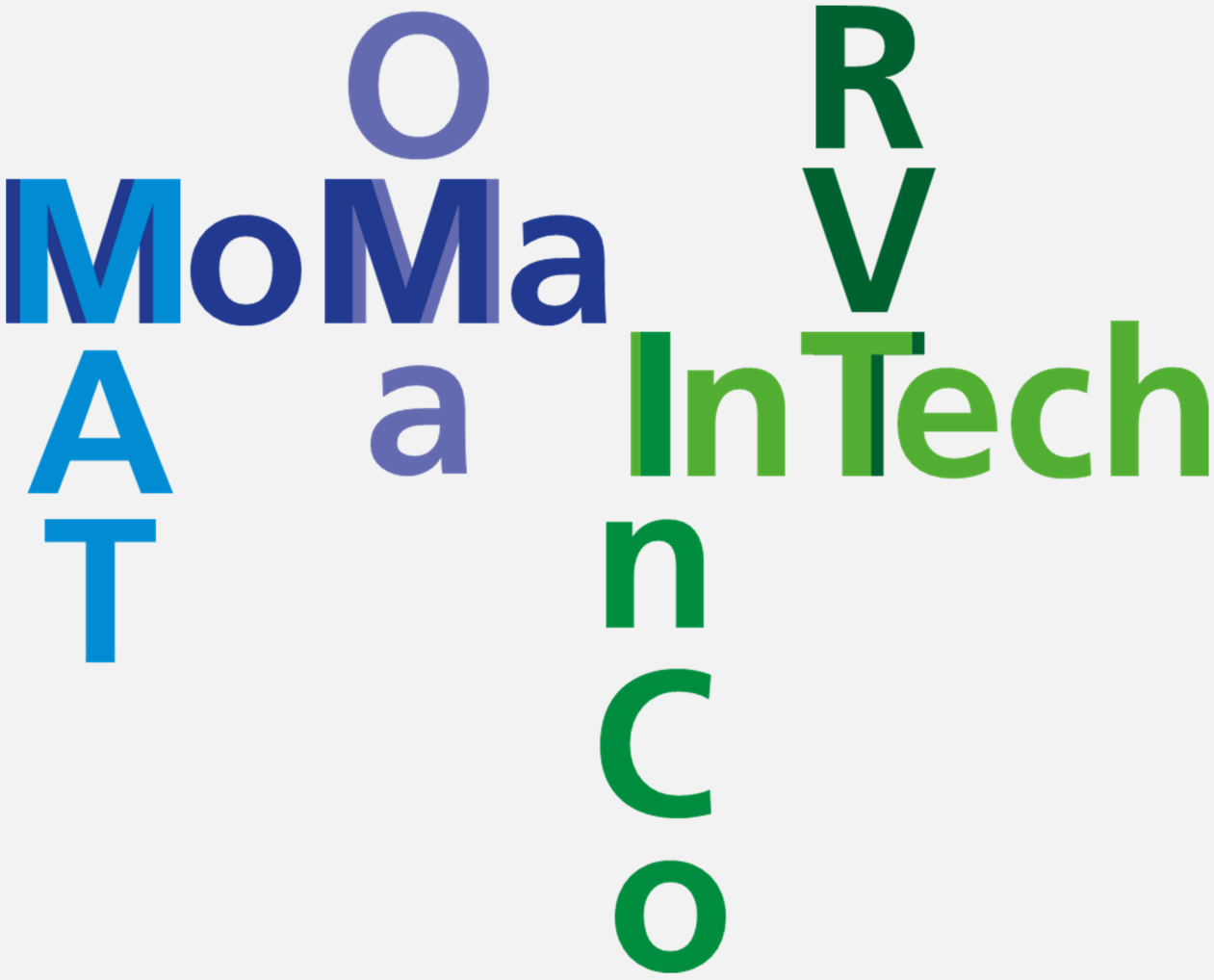
Swiss Federal Railways SBB and SWISSRAIL Industry Association

Information

SUPSI, Department of Innovative Technologies
Galleria 2
CH-6928 Manno
T +41 58 666 66 84
F +41 58 666 65 71
dti.fc@supsi.ch
www.supsi.ch/dti
rsm.msfi.ch

Document Version

V05P / 15.06.2018
File name: 20180615_CAS_MAT_Advanced Technologies_V05P



An integrated approach for the next generation of mobility professionals

With the support of

SBB CFF FFS

SWISSRAIL
Industry Association