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Department’s numbers:

- 350 collaborators
- 881 Bachelor’s and Master’s students
- +500 participants in Continuing Education courses (Advanced Studies)
- 6 research institutes

Due to the quality and quantity of its education and research activities, SUPSI’s Department of Innovative Technologies has become a reference point for the economic fabric of the region, increasingly consolidating its position also at Swiss and international level.

The Department of Innovative Technologies (DTI) deals with engineering sciences in the applied fields of information technology, artificial intelligence, electronics, mechanics, industrial production and medical technologies.

The Department’s action towards the discipline of Engineering and its industrial applications is realised through Bachelor’s and Master’s degrees, continuing education, applied research and knowledge transfer to companies and institutions.
Bachelor’s and Master’s Education

The Department of Innovative Technologies offers five Bachelor of Science degrees, two Master of Science degrees, and one Master of Arts degree, all of which are recognised at federal and European level.

Bachelor of Science (180 ECTS)
- Computer Science
- Data Science and Artificial Intelligence
- Electrical Engineering
- Engineering and Management
- Mechanical Engineering

Master of Science:
- MSC in Engineering (90 ECTS)
- MSC in Engineering EIT Manufacturing
- Double Degree (120 ECTS)

Master of Arts:
- Mathematics Teaching (124 ECTS)

Bachelor of Science (120 ECTS)
The Bachelor in Computer Science trains a professional with expertise in the technical and methodological fields related to the design and development of software systems and the management of systems in the field of information and communication technologies (ICT). The study programme is strongly practice-oriented with the aim of facilitating professional integration.

The course aims to provide practical skills in the basic professional subjects related to computer science, with an emphasis on software development and engineering, data management and algorithms. During the final semesters, it is possible to undertake a specialisation pathway through the choice of specific modules, including, among others, the following new topics:
- Game Development
- Linguistic Data Processing
- Machine Learning
- Security and Privacy by design
- User Experience Design

Some specialised mandatory subjects, combined with optional modules, allow the study path to be further profiled. E.g.:
- Computer Graphics and Virtual Reality
- Cybersecurity and Cybercrime
- Data Science and Machine Learning
- Development of distributed applications

Insights are updated annually to be in line with technological developments and market needs. The course also includes numerous activities and group work, as well as the development of social, communication, economics and entrepreneurial skills to foster the ability to work in multidisciplinary teams and contexts.

Professional prospects:
- Consulting (development methodologies, systems and data management, strategic view of computerised business processes)
- Systems management and network systems
- Data management and information extraction
- Software development

Data Science and Artificial Intelligence
The Bachelor in Data Science and Artificial Intelligence provides an in-depth understanding of fundamental methods of AI and data science and implement them into production, e.g. in companies and institutions that work with large amounts of data and want to make their decision-making processes more closely linked to the information they contain (e.g. financial and marketing institutions, manufacturing and process industries, transport systems, the healthcare sector, etc.).

The graduate in Data Science and Artificial Intelligence is able to operate in the different phases of data analysis, namely:
- Collection, choice of analysis method, implementation, evaluation of results, evaluation of ethical and privacy implications
- Extract information and knowledge from data, also by means of machine learning techniques
- Develop artificial intelligence software models and libraries for autonomous systems, optimising their security and performance
- Communicate the results also to a non-specialist audience

The course adopts a training approach based on project work and multidisciplinarity. All classes include hands-on laboratory activities to develop the computational and implementation components; activities such as data challenges and hackathons are also planned to stimulate problem-solving skills, as well as in-depth discussions on communication and project management.

Classes are held in English, with the possibilitiy of taking some courses in Italian if already available within the Department’s offer.

Professional activities and prospects:
- Data scientist/Analyst/Manager
- Machine learning engineer
- Business Intelligence Developer
- Big Data Engineer/Architect
- Research scientist

Electrical Engineering
The Bachelor in Electrical Engineering uses electricity as an energy carrier and a means of processing information. In this field, systems integrating sensors, actuators, power circuits and microprocessors are designed to develop algorithms and signal processing techniques belonging to the fields of telecommunications, automation, etc. The applications concern the solution of problems related to contemporary and future challenges of mankind, such as industrial innovation, development of renewable energies, space technologies, etc.

The Bachelor’s degree in Electrical Engineering in the first 4 semesters covers basic subjects in depth, including mathematics, physics, electrical engineering, analogue and digital electronics, programming, metrology and microelectronics. In the last 2 semesters, there is a choice of two in-depth subjects:
- Signal and control electronics: focuses on aspects of numerical signal processing in the embedded environment.
- Energy: focuses on aspects of centralised (nuclear, coal, etc.) and distributed (solar, wind, etc.) electricity generation.

It includes: development of numerical filtering algorithms, techniques for realising integrated circuits, applications of electromagnetic fields, automatic control of mechatronic systems.

In addition to in-depth studies and professionalising subjects in the most advanced fields of electronics, the curriculum includes practical laboratory activities and semester and diploma projects carried out both at the Department and in collaboration with local companies.

Professional activities and prospects:
- Research and development in the fields of automation, telecommunications, energy, electrification, intelligent electronic systems, etc.
- Quality, marketing and sales manager in companies in the sector
- Team leadership roles
The management engineer has ingenious technical skills combined with a broad knowledge of the components of the socio-economic system. This allows him/her to be a flexible professional capable of dealing with complex decision-making processes. The digitalisation of production systems, the increasing emphasis on the concept of sustainability, the importance of social networks and new production technologies are just some of the aspects that redefine the challenges that companies must respond to in order to remain on the market.

The curriculum of the Bachelor’s degree in Engineering and Management includes the teaching of basic subjects (e.g. analysis, economics, physics, mechanics and programming) in the first 2 semesters. From the 3rd semester onwards, vocational subjects such as production and logistics, industrial plant management and industrial production are taught. From the 4th semester onwards, it is possible to choose various in-depth subjects, including:

- Additive Manufacturing
- Industry 4.0 and factory of the future
- Industrial sustainability
- Logistics
- Pharmaceuticals
- Supply chain resilience

The in-depth studies are an excellent specialisation tool for the student, who is thus brought closer to the world of companies, sponsors of the projects proposed within the various options. The Bachelor’s thesis and projects, starting from a solid theoretical framework, are practical and well-contextualised activities always carried out with local companies.

Professional activities and perspectives:

- Risk management in finance and industry
- Organisation and automation of production systems
- Logistics systems planning and management
- Production manager
- Responsible for corporate sustainability aspects

The Bachelor’s course in Mechanical Engineering trains a professional profile capable of combining theoretical-scientific aspects with the ability to identify, formulate and solve complex problems or problems requiring an interdisciplinary approach in an innovative way.

In the first two semesters, the study plan includes a prevalence of basic subjects such as analysis, linear algebra, physics and chemistry, which serve as a foundation for the students to continue their studies. In the following semesters, alternating theory lessons with exercises and laboratories, the focus shifts to professional subjects such as machine elements, material resistance, finite element analysis, automation, robotics, fluid dynamics, thermodynamics, metrology and energy efficiency.

From the 4th semester onwards, it is possible to choose from a number of modules focusing on the following subjects:

- Business organisation
- Design and production
- Energy
- Railway technology
- Soft skills

The mechanical engineer is responsible for product development, design and the control of production processes. For these reasons, among the engineering jobs, it is the professional figure most demanded by Swiss companies.

Professional activities and prospects:

- Study and development of machines, instruments, apparatus, products and mechanical systems
- Choice of materials and technological processes for the manufacture of components and products
- Optimisation of production processes and design of machinery for the manufacture of products
- Performance of tasks in the evaluation, installation, operation and maintenance of mechanical systems

The Master of Science in Engineering (MSE) is offered in collaboration with the 7 other Swiss professional universities and has 15 specialisation profiles covering the various engineering disciplines, 11 of which are in the Engineering and IT Field and 4 in the Construction and Planning field. Within this offer, SUPSI delivers the following profiles: Engineering and IT

- Aviation
- Business engineering
- Computer science
- Data science
- Electrical engineering
- Energy & Environment
- Mechanical engineering
- Mechatronics & Automation
- Medical engineering
- Photonics

Construction and Planning

- Civil engineering

Structured over 3 semesters for a total of 90 ECTS, the Master of Science in Engineering programme consists of 2/3 theoretical lectures and 1/3 practical activities (projects, research, seminars and thesis work).

Lectures are held in Lugano in English, in Lausanne in English or French, in Zurich in English or German.

The Master of Science in Engineering guarantees a broad range of choice and the possibility to tailor the path of study according to one’s interests and professional goals with the support of an advisor.

The MSE EIT Manufacturing Double Degree is a double degree course offered as part of the Master of Science in Engineering of the Department of Innovative Technologies, jointly developed by SUPSI and other leading partner universities in Europe:

- École Centrale de Nantes (France)
- Politecnico di Milano (Italy)
- Technische Universität Wien (Austria)
- University College Dublin (Ireland)
- University of Trento (Italy)

With the MSE EIT Manufacturing Double Degree, students acquire technical skills typical of engineering courses and knowledge in the field of innovation and entrepreneurship, consolidating their experience through mobility and innovative learning opportunities (e.g. real case studies, visits, internships, summer schools).

Enrolling in the EIT Manufacturing Double Degree, students can choose among five study paths, four of which are offered by the Department of Innovative Technologies:

1. People and Robots for Sustainable Work
2. Additive Manufacturing for Full Flexibility
3. Platforms for Digitised Value Networks
4. Data Science and AI for Competitive Manufacturing
5. Business Engineering for NEW Territories

On completion of the course, students obtain:

- a Master of Science in Engineering SUPSI diploma (90 ECTS)
- a Master’s degree awarded by the partner university (120 ECTS) with the possibility of entering a PhD programme
- an EIT Label Certificate

Master of Science in Engineering

MSE EIT Manufacturing Double Degree

The Master of Arts in Mathematics Teaching in Secondary Schools is offered by the Department of Innovative Technologies in collaboration with the Department of Education and Learning of SUPSI. Studies last three years for a total of 124 ECTS. The first year focuses on disciplinary fundamentals and takes place mainly at the University of Innovative Technologies in Lugano. The second and third years focus on disciplinary didactics and take place mainly at the Department of Formation and Learning in Locarno, as well as at one or more public local secondary schools.
The Department of Innovative Technologies offers a wide range of advanced and continuing education courses for professionals active in the world of engineering and new technologies who intend to remain competitive and aligned with the emerging needs of the market and society.

In particular, the areas of competence in which the Department’s continuing education operates are as follows:

- Computer Engineering
- Electronic Engineering
- Fashion Innovation
- Industrial engineering
- Management Engineering
- Project management

All continuing education courses of the Department of Innovative Technologies combine the transmission of theoretical knowledge with numerous practical exercises, ensuring participants to have the opportunity to confront practical experience and not only ‘case studies’. Careful attention is also paid to tailor-made training in order to be closer to the needs of individual organisations.

The DTI’s continuing education is also characterised by a flexible approach: courses are mainly delivered in hybrid and blended format, both in-presence and online, to allow the best possible reconciliation of personal, professional and study commitments. Interactive lessons with video-clips, exercises and open discussions are offered through the online teaching tools; there is also the possibility to record lessons and shape one’s own learning path in an increasingly individualised way.

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All Advanced Studies courses (MAS, DAS and CAS) are federally and cantonally recognised.

Master of Advanced Studies:

(60 ECTS)
Specialised courses, lasting two or three years, which respond to a need for career development linked to a recognised profession. It is the highest qualification obtainable as part of university continuing education.
- MAS Fashion Innovation
- MAS ICT Systems, Security and Cybercrime
- MAS Industrial Engineering and Operations
- MAS IT Management and Governance
- MAS Project, Programme and Portfolio Management

Diploma of Advanced Studies:

(30 to 90 ECTS)
Professional courses that specialise in a specific field or activity. In some cases a Diploma of Advanced Studies may be integrated into a MAS pathway.
- DAS IT Management
- DAS Project Management

Certificate of Advanced Studies:

(10 to 29 ECTS)
Courses that offer timely responses to punctual professional development needs. Often the Certificate of Advanced Studies is part of a DAS or MAS.
- CAS Advanced Project Management
- CAS Advanced Project Management Skills
- CAS Big Data Analytics and Machine Learning
- CAS Blockchain
- CAS Business Analysis
- CAS Business Process Management
- CAS Developing soft skills: new skills for project and task management
- CAS Developing agile and adaptive organisations
- CAS Digital Marketing and E-Commerce Manager
- CAS DPO Privacy and Data Protection
- CAS Fintech
- CAS Health, safety and environmental management systems
- CAS Lean Management and Six Sigma
- CAS Project Management
- CAS Risk Management
- CAS Service Project Management
- CAS Sustainable Facility Management

Short-term courses
Programmes of varying duration (from a minimum of 12 to a maximum of 48 lecture hours) awarding 2 to 4 ECTS or a certificate of attendance.

Events and Webinars
The DTI’s continuing education also organises individual one-day training events and numerous free one-hour online lectures on topics of broad interest (e.g. leadership, effective communication and project management).

Tailor-made courses
Customised courses for companies and institutions with specific needs. A training programme for the company is a service designed to meet the client’s specific goals and strategies and is realised through the analysis of the training needs, the design, the delivery of the intervention, the evaluation of the course and the transfer after the training is completed.

Educational offer 2022-2023

www.supsi.ch/go/dti-continuingeducation
Research, Development and Knowledge Transfer

The Department of Innovative Technologies conducts a qualified research activity, recognised at local, federal and international level in the technical and scientific fields of its competence: information technology, artificial intelligence, electronics, mechanics, industrial production and medical technologies.

The following research institutes are active within the Department:
- Dalle Molle Institute for Artificial Intelligence (IDSIA USI-SUPSI)
- Institute of Systems and Applied Electronics
- Institute of Information Systems and Networking
- Institute of Systems and Technologies for Sustainable Production
- Institute of Digital Technologies for Personalised Healthcare
- Institute of Mechanical Engineering and Materials Technology

The Department also includes the Digital Forensic Service, a unit that provides computer forensic support to the police and judiciary bodies of the Canton of Ticino.

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- Institute of Systems and Applied Electronics
- Institute of Information Systems and Networking
- Institute of Systems and Technologies for Sustainable Production
- Institute of Digital Technologies for Personalised Healthcare
- Institute of Mechanical Engineering and Materials Technology

The research projects developed by IDSIA USI-SUPSI are supported and financed at national level by the Swiss Innovation Agency (Innosuisse) and the Swiss National Science Foundation (SNSF). However, the Institute also participates in projects promoted by the Foundation (SNSF) and the Swiss National Science Foundation (INNOVATE) and the management of swarms of robots (including drones) without centralised control. The research area of Artificial Intelligence has traditionally been one of the Institute’s main areas of development and is still evolving significantly.

The last two decades have witnessed a remarkable emergence and maturation of technologies dealing with visual and geometric information. Many methods that were the domain of research laboratories have become standard industry practice, such as Google Earth, Google Street View, Microsoft Kinect and 3D film animation. These examples belong to the field of geometric and visual computing, a combination of computer science and mathematical modeling that deals with the processing and analysis of visual and geometric information.

The research area “Intelligent control for systems and networks” is becoming increasingly important for IDSIA due to its applications in the field of industrial processes (Industry 4.0) and innovative energy systems (Smart Grids). The research sub-areas developed are: optimal control and self-calibration of dynamic systems for industrial control and integration of artificial intelligence and combinatorial optimisation algorithms for intelligent control and planning.

The research area of Machine Learning has traditionally been one of the Institute’s main areas of development and is still evolving significantly.

The research area in ‘Theory and Algorithms’ deals with the study of problems at the heart of computer science using a rigorous, mathematically-based theoretical approach to deepen theoretical knowledge about computation. Specifically, the Institute designs new algorithms and analyses their performance in mathematical terms; it is also shown that for a given problem there are no possible algorithms capable of solving it with certain performance.

The Dalle Molle Institute for Artificial Intelligence (IDSIA USI-SUPSI) is internationally recognised as one of the pioneering centres for AI studies. In particular, it carries out basic and applied research in the field of AI with important spin-offs for industry and the economy in collaboration with companies and institutions.

Research topics:
- Autonomous Robotics
- Computational Geometry and Computer Vision
- Intelligent control for systems and networks
- Machine Learning
- Natural language Processing and Information Retrieval
- Theory and Algorithms

The research projects developed by IDSIA USI-SUPSI are supported and financed at national level by the Swiss Innovation Agency (Innosuisse) and the Swiss National Science Foundation (SNSF). However, the Institute also participates in projects promoted by the European Community and the European Research Council (ERC). In addition to research activities, more than half of the Institute’s employees are also involved in teaching activities at all levels: Bachelor’s, Master’s, Ph.D. and Continuing Education.

Awards and publications:
- Swiss ICT Special Award (2016)
- Almost 150 papers per year presented at conferences and published in peer reviewed journals
- Almost 200 applied research projects per year
- Almost 60 specialized technological labs
- Almost 23 Mio di CHF financial volume (in Mio di CHF)
- Almost 58 ISIN researchers
- Almost 66 ISTePS
- Almost 44 MEMTI
- Almost 14 MeDiTech

www.idsia.ch
The Institute deals with systems and technologies of electronics and technical informatics applied to the development of products and methodologies for business innovation, improvement of production processes and knowledge transfer. In its areas of expertise, ISEA develops numerous projects funded by European research programmes, private foundations and through direct mandates. This substantial research activity is carried out in close contact with academia, industry and institutions at local, national and international level.

The specialised skills and qualified profile of its collaborators make ISEA the ideal partner for high-tech projects in various sectors: from industrial to telecommunications, from biomedical to aerospace and automotive and energy.

The Institute also contributes to the development of the DTI’s educational offerings, specifically the Bachelor’s degree course in electronic engineering.

Applied photonics and optoelectronics
In the field of light electronics, the Institute’s research activities focus on various areas including photonics, optoelectronics, colorimetry, spectrophotometry, polarimetry, laser systems, light source-based transmission systems, illumination technology and hyperspectral imaging.

Electronic systems
ISEA has scientific expertise in the fields of analogue and digital, discrete and integrated electronics, intelligent embedded systems with microprocessors and communication interfaces. Activities in this field focus on the design of electronic systems and platforms, the development of firmware and software, on integrated components (CPLDs, FPGAs) and on silicon (mixed signal ASICs), through to applications based on the integration of algorithms in DSP. The Institute also works on analogue signal processing and has experience in power electronics, low power electronics, fieldbusses and wireless communications.

Electronic systems in the medical and assistive sector
ISEA carries out research projects in the field of medical diagnostics, tomography and electromyography, also dealing with the field of medical diagnostics, tomography and environmental monitoring. ISEA also has expertise in rapid prototyping and control of machining processes. The Institute has outstanding expertise in microelectromechanical systems. These skills are applied both in the biomedical field with the engineering of systems for cell culture and monitoring of vital parameters, and in the machine industry with high-precision and dynamic systems and the control of machining processes. The Institute also has expertise in rapid prototyping and real-time software development.

RF electronics and antennas
The Institute has outstanding expertise in radio frequency (RF) and microwave systems and antennas from the modelling and simulation of electromagnetic systems to the design of RF systems and their testing with RF instrumentation. Activities include the development of telecommunication systems, the integration of communication protocols, the design of antennas, identification (RFID) and geolocation (GNSS/GPS) devices and in the field of the Internet of Things. Particular interest is in the use of low-power microwaves in the industrial (non-invasive analysis of materials), medical (microwave tomography) and environmental monitoring (radar for terrestrial monitoring) fields. ISEA is accredited with the Federal Institute of Metrology (METAS) for the measurement of non-ionising radiation.

Power and energy electronics
ISEA focuses on the management, reduction and optimisation of energy consumption. Application fields range from energy scavenging to smart metering, smart-home, smart-grids and smart-cities. Applied photonics and optoelectronics. In the field of light electronics, the Institute’s research activities focus on various areas including photonics, optoelectronics, colorimetry, spectrophotometry, polarimetry, laser systems, light source-based transmission systems, illumination technology and hyperspectral imaging.

Precision mechatronic and microtechnical systems
ISEA deals with the design and control of electrical machines, miniaturised electro-mechanical and microtechnical systems, actuators, sensors and positioning systems. These skills are applied both in the biomedical field with the engineering of systems for cell culture and monitoring of vital parameters, and in the machine industry with high-precision and dynamic systems and the control of machining processes. The Institute also has expertise in rapid prototyping and real-time software development.

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ISEA's competencies include digital signal processing, digital signal processor and geolocation (GNSS/GPS) devices. ISEA employees have strong competencies in a wide range of areas, including:
- Computer graphics
- Databases and other storage solutions
- Data mining
- Development paradigms and methodologies
- Frameworks and development tools
- Network architectures and protocols
- Operating systems
- Programming languages
- Software architectures

Data analysis and processing
ISEA can provide access to high-definition audiovisual content, in parallel, virtual reality and mixed reality solutions. Users can experience new dimensions of entertainment in various sectors including the real world, immersive audio, video and multimedia applications.

Multimedia and educational technologies
Advanced multimedia technologies provide high-definition audiovisual content, in parallel, virtual reality and mixed reality solutions. Users can experience new dimensions of entertainment in various sectors including the real world, immersive audio, video and multimedia applications.

Today, access to the Internet is offered by advanced human-machine and machine-machine interfaces provided by computers and intelligent devices. Users and things perform pervasive forms of communication and interact with complex systems integrating sensors, actuators and IT infrastructures in a wide range of application domains from smart living to industry.

ISEA's expertise includes human-computer and computer-computer interfaces, distributed and polyomorphous user interfaces, natural language processing, smart sensor (wearable) frameworks, IoT and mobile application development, wireless technologies, wireless sensor networks, pervasive computing, cyber physical systems for smart homes/cities/regions, social media/networks, cognitive and semantic systems, and big data processing.

Awards:
- EIT-M Success Story Award (2020)
- JST ICT Award (2011)
- Best Paper Award, Geo China (2018)

www.supsi.ch/isea_en
www.supsi.ch/isin
Human-centred manufacturing systems
Digitalisation and artificial intelligence are emerging technologies with a strong impact on the manufacturing sector. To overcome the limitations of their interaction with humans, the Institute supports companies in introducing and orchestrating intelligent perception devices at the shop-floor level to create environments where humans and factory automation work together synergistically.

Intelligent Automation
To meet the requirements of resilient and flexible manufacturing operations, modern industries must adequately manage intelligent automation, reinforced by simulation and data analysis activities. ISTePS supports companies in the application of these new technologies and the development of appropriate skills. Technology transfer and vocational training are carried out with the support of the Mini-Factory 4.0, a small-scale production system integrating concepts of modularity and intelligent automation.

Industrial technologies and systems for Additive Manufacturing and laser processing
Innovative additive manufacturing (AM) systems adopt various process technologies that enable the production of components with complex shapes for a wide range of applications. This research area focuses on the design and engineering of machines and mechatronic modules for the AM of metallic materials combined with ablation technologies and realised with real-time laser process control; as well as the design, inspection and functional characterisation of the parts produced.

Robotic and Modular Production Systems
This research area focuses on the design, configuration, engineering and integration of flexible and customised industrial robots, considering complex and highly precise manufacturing processes, as well as aspects of cooperation with other machines and the operator. In particular, modular, collaborative and mobile robotics solutions are developed for maintenance in hostile environments, as well as systems equipped with lasers and machine vision.

Sustainable manufacturing and the circular economy
Sustainability has become a key element for the competitiveness of the manufacturing sector. ISTePS accompanies manufacturing companies and their supply chains in the transformation process towards sustainability: from the assessment of performance against validated maturity models, through the provision of consultancy services that exploit the principles of the circular economy, to project implementation and monitoring of the results achieved.

The Institute of Digital Technologies for Personalised Healthcare (MeDiTech)

The Institute of Digital Technologies for Personalised Healthcare (MeDiTech) coordinates the interdisciplinary competences and activities associated with research and teaching in the field of medical technology at SUPSi’s Department of Innovative Technologies. In particular, it deals with the study and testing of new approaches for the development of healthcare, therapies and medical devices through the integration of digital technologies capable of collecting, analysing and processing large quantities of heterogeneous data.

The Institute’s research activities focus on the implementation of digital healthcare solutions and data analysis tools to support medical decision-making processes. The fields of application are manifold: development of digital health care platforms, design of diagnostic systems, management information systems, resolution of complex decision-making sequences with applications ranging from diagnostics and treatment methods to drug delivery.

MeDiTech’s research activities are carried out in collaboration with local, national and international companies and clinics and are structured around three strongly interdependent scientific areas:
- Biomedical Signal Processing
- Digital Health
- Medical Devices

The Institute also contributes to the educational offerings of the Department of Innovative Technologies through the provision of various Bachelor’s and Master’s degree and continuing education courses.

Awards:
- Swiss Dinno Award (2020)
- Innovation Radar (2019)
- Woman Led Innovation (2019)

Medical Devices
The interdisciplinary approach in the integration of scientific and technological advances in areas such as biology, chemistry, physics, engineering, computer science and medicine increases the ability to manipulate matter at the molecular level, which is fundamental for the development of diagnostics, analytics, therapeutics and medical instrumentation.

The research area in Medical Devices deals with the development of devices and systems with different integrative steps ranging from nanotechnology (nanomaterials, biomaterials, microtechnology), photonics and sensor technology, and microdeVICES, to the realisation of highly integrated systems for the understanding of cellular and molecular biology, as well as for diagnosis and aiding therapy.

MeDiTech Institute aims to become a regionally and federally recognised centre for the design and development of digital solutions and medical diagnostic and therapeutic devices based on innovative technologies.
Science in Engineering.
and scientific activities within the Master of Management Engineering and some teaching degree course in Mechanical Engineering, educational programmes of the Department, The Institute also contributes to the national and international corporate partners. (Innosuisse) and direct mandates from local, funds, including the Swiss Innovation Agency MEMTi takes part in applied research competitiveness. market requirements and improve product innovative technical solutions to meet new and is concerned with the development of the manufacturing and energy industries

Materials Technology (MEMTi) is active in the Institute of Mechanical Engineering and Materials

and Transversal Skills and Competences

Computational Materials Science
MEMTi has well-established expertise in the fields of physical-chemical-computational modelling and multi-scale molecular modelling, tools for studying and designing new types of materials for a wide range of applications (e.g. biomedical sector, advanced technological materials). Technical competences range from atomistic to multi-scale molecular modeling approaches, from classical to advanced computer simulation to data analysis approaches. Together with a solid background in the materials science and computational chemistry, these skills are crucial for supporting the design of technological materials and exploring new concepts for creating materials with innovative properties and functions.

Design and optimisation of production processes

Simulation is becoming the most widely used tool in the design and optimisation of production processes such as plastic injection moulding, metal forming, welding and additive manufacturing. MEMTi specialises in simulation techniques for evaluating the effect of manufacturing parameters on the mechanical behaviour of the product to be manufactured.

Hybrid Materials

The Institute’s research includes the field of hybrid materials, with a focus on polymer-ceramic matrix composites and porous ceramic materials. In recent years, MEMTi has also developed knowledge and expertise in additive manufacturing techniques for the production of complex ceramic components.

Polymer Engineering

The Institute has extensive know-how in polymer science and technology, surface engineering and formulation engineering. It specialises in the development of sustainable flame-retardant polymers, (nano) composites tailor-made polymer composites, functional nano-coatings and bioregradable polymers for biomedical applications which are routinely used for modelling approaches.

Structural Mechanics

MEMTi develops innovative products and machines through a mix of design creativity and engineering excellence. The Institute has experience in using finite element calculation techniques to optimise and verify static and dynamic structures and to assess their strength, stability, long-term fatigue and creep reliability.

Thermo-fluid Dynamics

MEMTi specialises in the analysis and optimisation of thermo-fluid-dynamics of components, processes and systems. Application areas include thermal energy storage systems, innovative solar receivers, multiphase flows and medium/low temperature district heating networks. Engineering problems related to heat transfer and external aerodynamics are also addressed.

Digital Forensics Service

The Digital Forensics Service of the Department of Innovative Technologies is nationally and internationally renowned for its educational and consulting activities, as well as for its scientific support to judicial authorities, research and dissemination in the field of cyber security. The Service’s main competences concern strategic activities of monitoring, acquisition, management and analysis of digital information typically applied to the fields of cyber intelligence and information security.

In particular, the service is active in the following areas:
- Computational analysis of natural language in forensics
- Computer forensics
- Privacy and information security
- Detection and response to cyber incidents
- Social Engineering

The operational approach of the digital forensics service aims at involving multiple interdisciplinary skills available within SUPSI. In the context of computer forensics, it is essential to be able to combine different disciplinary, technical-scientific and professional competences with humanistic and transversal relational, communication and collaboration skills.

Within its mandate, the Service works in strategic collaboration with local, national and international bodies. The Service’s employees also contribute to the Department’s educational offerings by organising seminars for students in the third year of the Bachelor’s degree in Computer Engineering, as well as by providing Continuing Education courses (Certificate of Advanced Studies and Diploma of Advanced Studies) in the field of forensic computing. Thanks to their participation in seminars, symposia and scientific conferences in the field, they also have the opportunity to exchange views with experts active at national and international level, keeping abreast of the state of the art in the field.

Innovations and Research Spin-offs

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The Institute’s research includes the field of hybrid materials, with a focus on polymer-ceramic matrix composites and porous ceramic materials. In recent years, MEMTi has also developed knowledge and expertise in additive manufacturing techniques for the production of complex ceramic components.

Polymer Engineering

The Institute has extensive know-how in polymer science and technology, surface engineering and formulation engineering. It specialises in the development of sustainable flame-retardant polymers, (nano) composites tailor-made polymer composites, functional nano-coatings and bioregradable polymers for biomedical applications which are routinely used for modelling approaches.

Structural Mechanics

MEMTi develops innovative products and machines through a mix of design creativity and engineering excellence. The Institute has experience in using finite element calculation techniques to optimise and verify static and dynamic structures and to assess their strength, stability, long-term fatigue and creep reliability.

Thermo-fluid Dynamics

MEMTi specialises in the analysis and optimisation of thermo-fluid-dynamics of components, processes and systems. Application areas include thermal energy storage systems, innovative solar receivers, multiphase flows and medium/low temperature district heating networks. Engineering problems related to heat transfer and external aerodynamics are also addressed.

Digital Forensics Service

The Digital Forensics Service of the Department of Innovative Technologies is nationally and internationally renowned for its educational and consulting activities, as well as for its scientific support to judicial authorities, research and dissemination in the field of cyber security. The Service’s main competences concern strategic activities of monitoring, acquisition, management and analysis of digital information typically applied to the fields of cyber intelligence and information security.

In particular, the service is active in the following areas:
- Computational analysis of natural language in forensics
- Computer forensics
- Privacy and information security
- Detection and response to cyber incidents
- Social Engineering

The operational approach of the digital forensics service aims at involving multiple interdisciplinary skills available within SUPSI. In the context of computer forensics, it is essential to be able to combine different disciplinary, technical-scientific and professional competences with humanistic and transversal relational, communication and collaboration skills.

Within its mandate, the Service works in strategic collaboration with local, national and international bodies. The Service’s employees also contribute to the Department’s educational offerings by organising seminars for students in the third year of the Bachelor’s degree in Computer Engineering, as well as by providing Continuing Education courses (Certificate of Advanced Studies and Diploma of Advanced Studies) in the field of forensic computing. Thanks to their participation in seminars, symposia and scientific conferences in the field, they also have the opportunity to exchange views with experts active at national and international level, keeping abreast of the state of the art in the field.

Innovations and Research Spin-offs
Collaborative Networks

The Department’s education, applied research and technology transfer activities are implemented through active involvement in networks, initiatives and projects supported by a wide range of funding sources and collaboration networks at local, national and international level.

At the federal level, the Department collaborates with the Swiss university network, in particular with other Universities of Applied Sciences (UAS) active in the field of engineering, in joint training and research projects supported by the State Secretariat for Education, Research and Innovation (SERI).

Of particular importance is the Master of Science in Engineering (MSE), developed in a network with the other Swiss universities of applied sciences, which includes SUPSI’s Department of Innovative Technologies as a venue for federally recognised courses and specialisation profiles. Since 2019, SUPSI has also been a partner in EIT Manufacturing, the Innovation Community within the European Institute of Innovation & Technology (EIT) that connects the main partners active in the manufacturing sector in Europe. In 2020, the EITM network launched the EIT Manufacturing Double Degree Master School, a programme jointly developed by SUPSI and other leading universities in Europe, with the Department of Innovative Technologies as the only Swiss actor involved.

In terms of applied research, the Department of Innovative Technologies is an active and recognised scientific partner in numerous thematic networks and projects supported by the federal government through the Swiss National Science Foundation (SNSF) and the Swiss Innovation Agency (Innosuisse).

The Department also participates in joint projects and initiatives of an international calibre, especially in the Horizon Europe, Eurostars and Eureka research programmes, as well as promoting exchanges of students, lecturers and researchers with prestigious foreign universities and institutions.

The Department’s Bachelor’s and Master’s degree programmes, continuing education and research activities have a strong impact especially at local level. In its areas of expertise (e.g. mechanics, robotics, AI), the DTI provides numerous services and carries out technology transfer activities for the benefit of companies and institutions, generating high added value spin-offs.

Available Services

BibliAgorà

A welcoming space dedicated to individual and group study. Users also have access to a computer, scanner, printer and photocopier. The BibliAgorà also offers help and advice on bibliographical research and bibliography writing.

Career, experience and orientation

The service organises and coordinates activities dedicated to the accompaniment, planning and development of educational and professional careers before, during and after university studies.

Gender and Diversity

The service promotes concrete projects and awareness-raising actions focusing on the dimensions of gender, generation, culture and ability, as well as on equal opportunities issues.

International Office

The service manages and administers activities related to internationalisation issues (both incoming and outgoing) for students, lecturers and staff. The service mainly deals with counselling and reception.

Language Skills Centre

The Language Skills Centre of SUPSI’s Department of Formation and Learning (DFL) organises courses in Italian, English and German for SUPSI and exchange students, with the aim of facilitating exchanges during studies and integration into the world of work. The centre also runs the Goethe-Institut Svizzera italiana examination centre and the Cambridge Examination Centre for Italian-speaking Switzerland.

mySUPSI

The mySUPSI card for students, alumni and employees provides access to numerous offers and benefits throughout Italian-speaking Switzerland (shops, services and restaurants).

Listening desk

Listening and psychological help desk to which one can turn following personal, interpersonal, emotional and relational difficulties.

Semester classroom

Final-year Bachelor’s students have at their disposal a classroom equipped for individual study and group work.

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SUPSI Alumni

The SUPSI Alumni Association brings together former SUPSI students and alumni. Through its dedicated website, it offers members an information and communication platform that facilitates the exchange of professional, personal and university contacts. SUPSI Alumni also offers a range of career guidance services: career counselling, job offers, career development courses. Members of the Association benefit from a number of advantages and can take advantage of numerous meeting opportunities offered depending on their area of interest.

SUPSI Sport

The sports service promotes numerous physical and sporting activities for students, professors and staff. The East Campus of Lugano-Viganello, headquarters of the Department of Innovative Technologies, also has a gymnasium with a training room and equipment room with instructors ready to support users with customised programmes and fitness tests.

SUPSI nursery

SUPSIInido is a service promoted by SUPSI Management to enable employees, students and students of SUPSI and external families to better reconcile their family, professional and/or study commitments. USI-SUPSIInido, a service that can accommodate up to 2.3 children, is active at the East Campus in Lugano-Viganello.

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