Lucerne University of
Applied Sciences and Arts

HOCHSCHULE
LUZERN

Engineering and Architecture

FH Zentralschweiz

Undergraduate
Engineering
Modules
in English

Academic Year
2021–2022

swissuniversities

Study in the heart of Switzerland

Lucerne, a world-famous center of culture and tourism, is also a center of education. It is home to the Lucerne University of Applied Sciences and Arts, which includes the following schools: School of Engineering and Architecture, School of Business, School of Computer Science and Information Technology, School of Social Work, School of Art and Design, and School of Music.

The School of Engineering and Architecture offers degree programs in the fields of architecture and interior design, building technology, civil- and structural engineering, as well as business-, digital-, energy systems-, electrical-, mechanical and medical engineering. The school focuses on extensive interdisciplinary research and group work in the unique areas of: "Building as a System" and "Energy Solutions".

You can expect state-of-the-art infrastructure, a stimulating interdisciplinary environment, and an exceptional faculty. Close to 2,000 undergraduates and graduates as well as almost 1,000 individuals in professional development programs benefit from the outstanding facilities provided on this attractive campus situated at the foot of Mount Pilatus, along the shores of Lake Lucerne.

2021–2022 Undergraduate Engineering Modules in English

Choosing to study for one or two semesters at the Lucerne School of Engineering and Architecture in Switzerland will be one of the best decisions you will ever make. Our program offers international and practice oriented modules that uniquely combine a classroom setting with practical work experience.

The Undergraduate Engineering Modules in English comprises core, related, project, and minor modules in six disciplines: Business Engineering (BE), Digital Engineering (DE), Energy Systems and Environmental Engineering (EESE), Electrical Engineering and Information Technology (EE), Mechanical Engineering (ME), and Medical Engineering (MT).
The project modules generally involve the application of course work to up-to-date and innovative projects in cooperation with Swiss based companies and guided by experienced senior lecturers. The accompanying minor modules – such as Swissness, which covers cultural aspects as well as language competencies – focus on the local context. Intensive weeks allow students to focus on a single subject for an entire week; pre- and post work is generally required to earn the credits. This comprehensive module program allows students to earn credits equivalent to a semester at their home university.

Students should enroll a minimum of three months prior to the start of the semester in order to obtain on-time approval from the immigration offices.

2021–2022 Academic Year

2021 AUTUMN SEMESTER (EXACT DATES ON PAGE 15)

ECTS for majors in:

1. Intensive weeks: first half of September		BE	DE	EESE	EE	ME	MT	Level
TA.AS	Asia – 2nd week	3	–	3	3	3	3	Intermediate
TA.OEK	Ecology – 2nd week	3	–	3	3	3	3	Basic
TA.LEAD	Leadership – 1st week	3	–	3	–	–	3	Intermediate
TA.ME+TE	Technology and Society – 2nd week	3	–	3	3	3	3	Basic
2. Core and Related Modules								
TA.AE	Advanced Electronics	–	–	–	3	–	–	Advanced
TA.PH+BAU	Building Envelope	–	–	3	–	3	–	Intermediate
I.CSF	Computer Science Fundamentals	6	–	6	6	–	6	Basic
I.NETW1	Networking 1	–	–	–	3	–	–	Intermediate
I.NETW2	Networking 2	–	–	–	3	–	–	Intermediate
TA.CON	Controlling	3	3	3	–	–	–	Intermediate
TA.CE_SB	Corporate Ethics and Sustainability	6	–	6	–	–	–	Advanced
TA.ET+V	Electrical Engineering Consolidation	–	–	3	3	–	–	Intermediate
TA.EFPLAB2	Energies, Fluids, and Processes Lab 2	3	3	3	–	3	3	Basic
TA.PA	Energy Optimization with Pinch Analysis	–	–	3	–	3	–	Advanced
TA.ET_EC	Energy Trading, Economics and Policies	3	–	3	–	–	–	Advanced
TA.EC_BIO	Environmental Chemistry and Biolology	–	–	3	–	–	–	Basic
TA.EE_ECO	Environmental Analysis and Ecology	–	–	6	–	–	–	Intermediate
TA.HFMPP	Hydro and Fluid Machinery for Power Plants	–	–	3	–	–	–	Advanced
TA.INTMA	International Marketing	3	–	3	–	–	–	Intermediate
TA.M_LAB	Materials Lab	–	–	3	–	3	–	Intermediate
TA.MATH	Mathematics Fundamentals	6	–	6	6	6	6	Basic
TA.MA+PHY2_T	Mathematics and Physics Technology 2	6	–	6	6	6	6	Intermediate
TA.EE_BIO	Renewable Energies – Bioenergy	3	–	3	–	3	–	Advanced
TA.SI	Service Innovation	3	–	3	–	–	–	Advanced
TA.SCM	Supply Chain Management	3	–	–	–	–	–	Advanced
TA.SE_EES	Systems Engineering for Energy and Environmental Systems	–	–	3	–	–	–	Basic
TA.SYS_MOD	Systems Modelling	–	–	3	–	–	–	Intermediate
TA.THFL+SIM	Thermodynamics and Fluid Dynamics – Simulations	–	–	–	–	6	–	Advanced
TA.USAB	Usability	3	–	3	3	3	–	Intermediate
3. Project Modules								
TA.KONTT1	Context Module T1	6	6	6	6	6	6	Basic
TA.PDP1	Engineering Product Development Project 1	6	6	6	6	6	6	Intermediate
TA.PAIND	Industrial Project	6	6	6	6	6	6	Advanced
TA.INTPRO	International Project*	6	–	6	6	6	6	Advanced
4. Minor Modules								
TA.SWISS	Swissness	3	3	3	3	3	3	Basic
TA.SWISS_GA1	Swissness and German Language A1	6	6	6	6	6	6	Basic
5. Language Modules								
TA.TECW	(English) Technical Writing	3	3	3	3	3	3	Advanced
W.SZ_DEUFF_A1	German Level A1	3	3	3	3	3	3	Basic
W.SZ_DEUFF_A2	German Level A2	3	3	3	3	3	3	Basic
W.SZ_DEUFF_B1	German Level B1	3	3	3	3	3	3	Intermediate
TA.DEFRC1	German Level C1	3	3	3	3	3	3	Advanced

* applying the Design Thinking methodology

BE = Business Engineering
EE = Electrical Engineering
ME = Mechanical Engineering
DE = Digital Engineering
EESE = Energy and Environmental Systems Engineering
MT = Medical Engineering

2022 SPRING SEMESTER (EXACT DATES ON PAGE 15)

ECTS for majors in:

1. Intensive weeks: first half of February		BE	DE	EESE	EE	ME	MT	Level
TA.DIST	Sales Management – 1st week	3	–	3	–	–	–	Intermediate
TA.WIND_ECO	Windpower and Ecotechnology – 1st week	3	–	3	3	3	–	Intermediate
TA.RECY	Recycling and its Impact on Sustainability – 2nd week	3	–	3	3	3	3	Basic
TA.NA	Sustainability – 2nd week	3	–	3	3	3	3	Basic
TA.PV_HELP	Design, build and commission Photovoltaic in Ethiopia (2 weeks)	–	–	3	3	–	–	Intermediate
2. Core and Related Modules								
TA.APC	Applied Process Control	–	–	3	3	3	–	Intermediate
TA.IGM	B2B Marketing	3	3	3	–	–	–	Basic
TA.ET+A	Basics of Electrical Drive Systems	–	–	3	3	3	3	Intermediate
I.CNF	Computer Networks Fundamentals	–	–	–	3	–	–	Intermediate
I.INFKOL	Computer Science Hot Topics	–	–	–	3	–	–	Advanced
TA.CRM	Customer Relationship Management	3	–	–	–	–	–	Advanced
TA.INDES1	Design Fundamentals	3	3	3	3	3	3	Basic
TA.DBM	Digital Business Models	3	–	–	–	–	–	Advanced
TA.DBPE	Digital Business Process Engineering	3	–	–	–	–	–	Advanced
TA.EPG	Electric Power Grids	–	–	3	3	–	–	Advanced
TA.ET+L	Electrical Engineering with Laboratory Work	3	–	3	3	3	3	Basic
TA.EFPLAB1	Energies, Fluids, Processes Lab 1	3	3	3	–	3	3	Basic
TA.STORAGE	Energy Storage Systems	–	–	3	3	3	–	Advanced
TA.EE_ECO	Environmental Engineering and Ecology	–	–	6	–	–	–	Advanced
TA.HLKS_EE	HVAC Systems	–	–	3	–	3	–	Intermediate
TA.INTRO	Infotronic	–	–	–	6	–	–	Advanced
TA.INNO_FN	Innovation Financing	3	–	3	–	–	–	Intermediate
TA.LINALG	Linear Algebra	3	3	3	3	3	3	Basic
TA.MM+RW	Marketing Management and Accounting	6	–	6	–	–	–	Basic
TA.MA+PHY1_T	Mathematics and Physics Technology 1	6	6	6	6	6	6	Basic
TA.JOURNAL	Medical Journal Club	–	–	–	–	–	3	Intermediate
TA.MC	Micro Controller	–	–	–	6	–	–	Intermediate
TA.NBD	New Business Development	3	–	–	–	–	–	Advanced
TA.ONMA	Online Marketing	3	–	–	–	–	–	Advanced
TA.OAE	Operations Excellence	3	–	–	–	–	–	Advanced
TA.EE_SOL	Renewable Energies – Solar Energy	–	–	3	–	3	–	Advanced
TA.SI	Service Innovation	3	–	3	–	–	–	Advanced
TA.SM+PM	Strategic Management and Product Management	6	–	6	–	–	–	Intermediate
TA.SES	Sustainable Energy Systems	–	–	6	6	6	–	Advanced
TA.TECHMECH	Technical Mechanics	3	–	3	3	–	–	Basic
TA.THFL	Thermodynamics and Fluid Dynamics	6	–	6	–	6	–	Intermediate
3. Project Modules								
TA.KONTT2	Context Module T2	3	3	3	3	3	3	Basic
TA.PDP2	Engineering Product Development Project 2	6	6	6	6	6	6	Intermediate
TA.PAIND	Industrial Project	6	6	6	6	6	6	Advanced
TA.INTPRO	International Project*	6	–	6	6	6	6	Advanced
4. Minor Modules								
TA.OPEN	Open Innovation	3	3	3	3	3	3	Intermediate
TA.SWISS	Swissness	3	3	3	3	3	3	Basic
TA.SWISS_GA1	Swissness and German Language A1	6	6	6	6	6	6	Basic
5. Language Modules								
TA.CPE_PREP	English Proficiency Preparation	3	3	3	3	3	3	Advanced
W.SZ_DEUFF_A1	German Level A1	3	3	3	3	3	3	Basic
W.SZ_DEUFF_A2	German Level A2	3	3	3	3	3	3	Basic
W.SZ_DEUFF_B2	German Level B2	3	3	3	3	3	3	Intermediate
TA.DEFRC2	German Level C2	3	3	3	3	3	3	Advanced

Core and Related Modules

ADVANCED ELECTRONICS (TA.AE) ADVANCED Concepts of analogue circuit design will be analysed, explored and scientifically commented. This will be done by theory, calculations, and simulations and verified by measurements and final discussions in expert groups. Examples of practical circuits are ECG-recording, charge metering, light ripple detector, ultrasonic converter etc. (Entry requirement: Electronic Circuit Design)

APPLIED PROCESS CONTROL (TA.APC) INTERMEDIATE Definition of signal and systems. Understanding of feedback loops. Use of the Laplace transformation to describe linear time invariant systems. Analysis of the stability of controlled processes. Introduction to PID controller. Simulation of closed-loop controlled processes with Matlab/Simulink. Understanding of basic controller development methods. (Entry requirement: TA.MATH)

B2B-MARKETING (TA.IGM) BASIC Basics of management activities that enable a firm to understand, create, and deliver value to other businesses, governments, and/or institutional customers. Inputs and case studies are used for understanding value, i.e. the examination of the three related business market processes; creating value through managing market offerings, new offering realization, and business channel management; and delivering value to customers by understanding the process of prospecting for new business relationships, assessing the mutual fit, making the initial sale, and fulfilling the initial order. (Entry requirement: TA.MM+RW)

BASICS OF ELECTRICAL DRIVE SYSTEMS (TA.ET+A) INTERMEDIATE Covering the functional principal, the equivalent circuit and the design fundamentals of the most common electrical machines and power electronic circuits like dc-converters, rectifiers, inverters and converters. Merging the components to efficient drive systems. Discussion of the advantages and disadvantages of the different systems. (Entry requirement: TA.ET+L and TA.ET+V)

BUILDING ENVELOPE (TA.PH+BAU) INTERMEDIATE Fundamentals of building physics and building construction, opaque and transparent building elements, shape and orientation of buildings, thermal use of masses, phenomena of building physics and impact on building functionality, building labels, planning processes, Swiss architectural standards. (Entry requirement: TA.THFL)

COMPUTER SCIENCE FUNDAMENTALS (I.CSF) BASIC Introduction to computer science and the Internet, Enterprise Resource Planning (ERP) systems, information systems, computer architectures and operating systems, software development process, basics of programming with Java, databases. (Entry requirement: none)

NETWORKING1 (I.NETW1) INTERMEDIATE Basic knowledge of IT networks is taught using the OSI and TCP/IP reference model. TCP/IP and Ethernet are studied in depth with practical exercises and the conception of networks is trained. IPv4 and IPv6 are approached on an equal level.

NETWORKING2 (I.NETW2) INTERMEDIATE Network basics in the areas of switching, VLAN, STP, EtherChannel, DHCP, WLAN and routing are taught and applied in laboratory exercises. The corresponding configuration of routers, switches and WLAN AP is trained in a practical way.

COMPUTER SCIENCE HOT TOPICS (I.INFKOL) ADVANCED Invited lecturers by practitioners and computer scientists. Discussions on current topics in computer science and its areas of application. Thesis work on a current topic: investigation after further sources, critical dispute and summary. (Entry requirement: Software systems, databases, ICT infrastructure, Computer Science projects)

CONTROLLING (TA.CON) INTERMEDIATE Establishing of a business plan including modelling and evaluating of financial consequences; conceptualizing of a management control and information system for management control along the whole value chain; conducting of project management/control. (Entry requirement: TA.MM+RW and TA.IGM)

CORPORATE ETHICS AND SUSTAINABILITY (TA.CE_SB) ADVANCED Fundamentals of Business Ethics (BE) and Corporate Responsibility (CR) for a practical use in different management positions. Students learn on the basis of case studies to get in contact with practitioners for exchange of experiences. Basic and well-grounded overview about BE/CR and central concepts, empirical situation, theoretical discussion and the implementation in management practice. Students will apply gained knowledge in energy-related simulation game allowing to experience real-world ethical challenges. (Entry requirement: Junior student).

CUSTOMER RELATIONSHIP MANAGEMENT (TA.CRM) ADVANCED Knowledge of modern concepts of planning, implementation and success control of a holistic customer relationship management, application of methods in the areas of customer identification, binding, development and recovery within the framework of current case studies and practical examples, taking into account ethical and legal aspects. (Entry requirement: Junior student)

Brief Description of Modules

Core and Related Modules

DESIGN FUNDAMENTALS (TA.INDES1) BASIC Fundamentals about the design process and theory of aesthetics, design history, theory of colours, perception, creativity and ecology in design. Application of knowledge regarding drawing and visualisation techniques. (Entry requirement: none)

DIGITAL BUSINESS MODELS (TA.DBM) ADVANCED Understand how digital technologies and business models are radically changing competitive dynamics and how multi-sided platforms and digital ecosystems can be developed. Opportunities and potential of digital transformation. Development of business models and strategies that support digital transformation. (Entry requirement: Junior student)

DIGITAL BUSINESS PROCESS ENGINEERING (TA.DBPE) ADVANCED This module provides an introduction to the fundamentals, approaches and methods required for digital business process engineering on the basis of a cycle-based framework model (5 phases), which represents a typical management cycle. Different models, methods and techniques are applied, based on concrete practical examples. Transfer of knowledge is been facilitated and active work is necessary (group exercises, case studies). (Entry requirements: Marketing Management and Accounting (MM+RW), Controlling (CON), Supply Chain Management (SCM), Development Excellence (DEVEX), or equivalent)

ELECTRICAL ENGINEERING CONSOLIDATION (TA.ET+V) INTERMEDIATE Consolidation of basic applications: due to enhanced mathematic skills it is possible to formulate and understand more realistic models. Analysis of meshed linear circuits for direct current and sinusoidal alternative current. Investigation of non-linear behavior by analysing ferromagnetic circuits. (Entry requirement: TA.ET+L)

ELECTRICAL ENGINEERING WITH LABORATORY WORK (TA.ET+L) BASIC Fundamentals of electrostatics, direct current, magnetic fields, and alternating current. Become acquainted with key components and systems through laboratory experiments. (Entry requirement: none)

ELECTRIC POWER GRIDS (TA.EPG) ADVANCED Transformation of primary energy into electrical energy. Fundamentals of the main grid components of a power system (generators, transformers, substations and transmission lines/cables). Grid analysis techniques such as load-flow and short circuit calculations. Methods of power system control. Analysis of blackouts and concepts of protection systems. (Entry requirement: ET+V, ET+A)

ENERGY, FLUID AND PROCESS ENGINEERING (TA.EFPENG) ADVANCED Fundamentals of mass transfer (including analogy of heat transfer and mass transfer). Numeric analysis in heat transfer and fluid mechanics. Operating principles of turbo-machinery and construction (pumps and turbines). Introduction in selected subjects of newable energy technology and process engineering by laboratory experiments. (Entry requirement: TA.THFL)

ENERGIES, FLUIDS, AND PROCESSES LAB 1 (TA.EFPLAB1) BASIC Introduction to the fundamentals of energy technology, balancing of systems (mass, material and energy), state variables and fluid properties (gases and liquids), forms of energy and energy transformations, basics of heat transfer, energy conservation for fluid mechanics (Bernoulli equation) and thermodynamics (1st LT) for closed and open systems. Practical relevance through lab tests with heat exchangers, pumps, compressors. (Entry requirement: none)

ENERGIES, FLUIDS, AND PROCESSES LAB 2 (TA.EFPLAB2) INTERMEDIATE Consolidation of the fundamentals of energy technology. Handling of complex energy conversion processes and machines based on laboratory tests (pelton turbine, heat pump, combustion process). (Entry requirement: TA.EFPLAB1 or equivalent)

ENERGY OPTIMIZATION WITH PINCH ANALYSIS (TA.PA) ADVANCED Refresher energy and process technology, fundamentals of Pinch Analysis and application of the engineering tool PinCH, representation of processes in composite curves, investment and operating costs, energy and cost targets, supertargeting, design of heat exchanger networks, optimization of utility systems, integration of heat pumps, combined heat and power systems, etc., introduction to batch and multiple base case process analysis, case studies from industry. (Entry requirement: TA.THFL)

ENERGY STORAGE SYSTEMS (TA.STORAGE) ADVANCED Overview of energy storage technologies. Methods to describe and characterize the storage of electricity and heat in the system context. Theoretical and experimental analysis of applied energy systems with storages, e.g.within a district network. (Entry requirement: TA.ET+L and TA.THFL)

ENERGY TRADING, ECONOMICS AND POLICIES (TA.ET_EC) ADVANCED Examine structures and trends of trading renewable energies as opposed to trading grey energies; trading of CO2 certificates and related projects, innovations in this area, political guidelines and their international ramifications. (Entry requirement: Junior student)

Entry requirements:
Junior students will have completed the first half of their studies.
Where students have taken similar subjects to the reference module this will be taken in to consideration.

ENVIRONMENTAL ANALYSIS AND ECOLOGY (TA.EE_ECO)
INTERMEDIATE   Introduction to fundamental concepts of environmental engineering and ecology, including sustainability, ecosystems, biodiversity and climate system; environmental impact assessment; implications of CO_2 emissions and other pollutants on natural systems and human mankind; application of analytical and economic tools for evaluating environmental impacts and causes of environmental problems. (Entry requirement: Junior-student).

ENVIRONMENTAL CHEMISTRY AND BIOLOGY (TA.EC_BIO)
BASIC   The following topics are covered: Atomic structure; isotopes; electron configuration of atoms; chemical bonds and structure of molecules; Introduction to organic compounds and aqueous solutions and ions. Chemical reactions and energy, as well as chemical equations and reversibility. Fundamentals of contamination, air pollution, water and soil chemistry. Natural composition of oceans and lakes. In addition, laboratory exercises and excursions are carried out. (Entry requirement: none)

HEAT & FLUID MACHINERY IN POWER PLANTS (TA.HFMPP)
ADVANCED   Fundamentals, basic components, classification, operating principles, and applications of heat- and fluid machines, including volumetric (positive displacement) machines, pumps, compressors, gas- steam- hydro- and wind turbines, pump turbines, heat pumps, and combined heat & power units. Calculation of the losses in pipelines and piping system elements, knowledge of the characteristics of the heat- and fluid machines (especially pumps) and operation of these energy machines in power plants. Deeper understanding of selected subjects of heat- and fluid machines by laboratory experiments. (Entry requirements: Fundamentals of Thermo- and Fluid dynamics)

HVAC SYSTEMS (TA.HLKS_EE) INTERMEDIATE   Indoor comfort requirements; systems for conditioning rooms; operating modes of building management systems; fundamentals for sizing HVAC systems; space requirements and integration into buildings; concepts for installation of ducts, pipes, central plants; energy and resource requirements; key Swiss building standards; phenomena of lab air flow pattern; inspecting building sites. (Entry requirement: TA.THFL)

INFOTRONIC (TA.INTRO) ADVANCED   Combination of hardware and software in embedded systems. Foundation and application of real-time systems. Design, development and maintenance of complex software and drivers in systems using multiple microcontrollers and programming languages. Usage of Eclipse with open source software, RTOS, Embedded Software Components and automatic code generation. (Entry requirement: Basic programming C; MC hardware, software, and programming)

INNOVATION FINANCING (TA.INNO_FN) INTERMEDIATE
Introduction to corporate finance, approaches to innovation financing, determining risk and return of investments, understanding capital structure decisions, performing project and company valuation. (Entry requirement: TA.MM+RW)

INTERNATIONAL MARKETING (TA.INTMA) INTERMEDIATE
Importance of international marketing for companies being active in today's business environment, assessment of international environment, importance of cultural diversity, development of international marketing strategies and marketing instruments, management and organization of international marketing activities, application in case studies and in a business simulation in teams. (Entry requirements: TA.MM+RW and TA.IGM attended)

LINEAR ALGEBRA (TA.LINALG) BASIC   Basics of linear algebra including matrix algebra and its applications, in particular on differential equations; modelling and discussion of applied problems; solution of mathematical problems with analytical and numerical methods, their graphical representation, in particular, using numerical software as e.g. MATLAB. (Entry requirement: TA.MATH)

MARKETING MANAGEMENT AND ACCOUNTING (TA.MM+RW)
BASIC   Understanding the fundamentals of marketing and research, establishing marketing plans and marketing controlling, using financial information for decision making, applying basic financial and management accounting methods. Basic understanding of and ability to analyse financial reporting. (Entry requirement: none)

MATERIALS LAB (TA.M_LAB) INTERMEDIATE   Overview, structure and types of engineering materials like metals, plastics, and ceramics including production and/or manufacturing processes. Experimental work in the laboratory on elasticity and plasticity of materials, tension tests on metals, impact test on metals at different temperatures and fatigue testing and damage. Case studies on materials under corrosion and at high temperatures. (Entry requirement: Basics of conceptual Chemistry)

MATHEMATICS FUNDAMENTALS (TA.MATH) BASIC   Development of the fundamental ideas of differential- and integral calculus (differential, infinitesimal growth, limit, integral). Derivation of the basic rules of calculus (product, quotient, chain rule, integration by substitution, integration by parts). Understanding the notions of variables and functions (dependencies, physical dimensions, growth, concavity, critical points, extremals, inflection points). Key examples from physics, geometry and applied sciences (position, velocity, acceleration, rates of change, tangent lines). Standard applications (optimization, analysis of functions, computation of volumes and areas). Infinite sequences and series. (Entry requirement: none)

Brief Description of Modules

Core and Related Modules

MATHEMATICS AND PHYSICS TECHNOLOGY 1 (TA.MA+ PHY1_T) BASIC   Basic concepts of mechanics and required mathematical tools. The latter include complex numbers, polynomials and differential equations. Based on these mathematical tools the following subjects in physics are covered: dynamics of point masses and rigid bodies using Newton's laws, the concepts of energy, work and momentum, and conservation laws in translational and rotating systems. (Entry requirement: TA.MATH)

MATHEMATICS AND PHYSICS TECHNOLOGY 2 (TA.MA+ PHY2_T) INTERMEDIATE   Math: partial differentiation, total differentiation, multivariable integration, path integration. Physics: oscillatory motion: simple harmonic, damped and driven oscillations. Wave motion. Microscopic description of heat, temperature and gas pressure. (Entry requirement: TA.MA+PHY1_T)

MEDICAL JOURNAL CLUB (TA.JOURNAL) INTERMEDIATE   Critical reading, analysis and discussion of scientific publications in the field of biology/medicine. Introduction to scientific language. (Entry requirement: Chemistry [CHEM] and Zellbiology [ZBIO] attended)

MICRO CONTROLLER (TA.MC) INTERMEDIATE   Fundamentals of microcontroller technology. Introduction to C-programming language. Detailed discussion of HW architecture and instruction execution by means of assembly-level programming of a commercial MCU. Hands-on lab exercises with embedded targets putting interrupts, timer, analog-to-digital converters and serial bus protocols into service. (Entry requirement: Hi-level programming [Java], Boolean algebra & binary arithmetics)

NEW BUSINESS DEVELOPMENT (TA.NBD) ADVANCED   Understand, assess and apply business development concepts. Analyze trends and identify and assess new business opportunities. Develop viable commercialization strategies for innovative technologies and products. Develop business plans and key figures as a management tool for new sustainable growth areas. (Entry requirement: Junior student)

ONLINE MARKETING (TA.ONMA) ADVANCED ADVANCED   Relevance of the use of digital media for the marketing concept of companies, knowledge of the essential tools of online marketing, planning, implementation and controlling of concrete measures taking into account risks and legal Framework. (Entry requirement: Junior student)

OPERATIONS EXCELLENCE (TA.OAE) ADVANCED   Expanding on Supply Chain Management, students deepen the concept of continuous improvement (Kaizen or Lean management). Tools out of the Toyota Production Systems are explained and used in case studies and in a production simulation game. Students experience how different tools are linked together and gain an understanding of the entire Kaizen process. (Entry requirement: Junior student)

RENEWABLE ENERGIES – BIOENERGY (TA.EE_BIO) ADVANCED   Potential of biomass as a source of renewable energy; measures against climate change; basics of combustion, gasification, pyrolysis, and fermentation of biomass; technology, efficiency ratios and costs of heat generation and electricity production; design and operation of wood heating systems; formation of pollutants, primary and secondary measures for their reduction; production and use of biofuels; ecological assessment of the overall efficiency ratio of wood heat, wood power and wood fuel . (Entry requirement: TA.THFL)

RENEWABLE ENERGIES – SOLAR ENERGY (TA.EE_SOL) ADVANCED   Imparting of physical fundamentals and technologies regarding the usage of solar energy. Along with solar heat in buildings also photovoltaics and concentrated solar thermal processes to generate electricity are discussed. Furthermore, planning fundamentals and commercial planning software as well as costs and profitability are part of the module. (Entry requirement: TA.THFL)

SERVICE INNOVATION (TA.SI) ADVANCED   The focus is on service innovations that aim to make the most of high value capital equipment. The creation of high impact innovation by cross-functional project teams will be discussed. The Stage Gate innovation process will be described and limitations will be discussed within the context of service products and service industries. (Entry requirement: TA.CON and TA.SM+PM)

STRATEGIC MANAGEMENT AND PRODUCT MANAGEMENT (TA.SM+PM) INTERMEDIATE   Fundamentals of strategic management; importance of corporate objectives; execution of strategic analysis; approach to strategic options, implementation, and controlling; fundamentals of product and innovation management; execution of a product lifecycle and a portfolio analysis; creation of a business model canvas; understanding the fundamentals of engineering requirements, approaches to market launch, concepts for service management and product controlling. (Entry requirement: TA.MM+RW and TA.IGM)

Entry requirements:
Junior students will have completed the first half of their studies.
Where students have taken similar subjects to the reference module this will be taken in to consideration.

SUPPLY CHAIN MANAGEMENT (TA.SCM) ADVANCED
Introduction to the operations of industrial companies, covering production, logistics, procurement, quality and safety and interfaces to sales and product development. Knowledge of the whole supply chain pipeline, including networks of clients and suppliers, their relationships and its impact on product costing. (Entry requirement: Junior student)

SUSTAINABLE ENERGY SYSTEMS (TA.SES) ADVANCED   When do projects deserve to be called "sustainable"? Investigate methods and innovations that address conditions of new systems, including the production of energy, its processing, distribution, application and conversion as well as environmental footprint and responsibility for everyone on our planet; focus on questions of economic feasi-bility, in particular on the costs for the environment and future generations. (Entry requirement: TA.THFL, TA.ET+V, TA.MM+RW, TA.SM+PM, and TA.PDP2)

SYSTEMS ENGINEERING FOR ENERGY AND ENVIRONMENTAL SYSTEMS (TA.SE_EES) BASIC   Introduction to the design and management of complex systems over their life cycles. Appropriate delimitation of systems. Illustration of the complexity of energy and environmental systems. Possibilities to structure systems and to reduce complexity of systems. (Entry requirement: none)

SYSTEMS MODELLING (TA.SYS_MOD) INTERMEDIATE   Fundamentals of mathematical description of systems and introduction of modelling tools. Students learn how to describe mathematically a system (linear models), as well as how to implement and solve the system in e.g. MATLAB and Python. The basics from system thinking and engineering will be applied in practical examples. (Entry requirement: Systems Engineering for Energy and Environmental Systems)

TECHNICAL MECHANICS (TA.TECHMECH) BASIC   Basics of product development process. Introduction to design methods and materials selection in design process. Overview of machine elements and their applications. Introduction to engineering mechanics: plain statics and strength of materials. (Entry requirement: Basics of engineering mechanics)

THERMODYNAMICS AND FLUID DYNAMICS (TA.THFL)
INTERMEDIATE   In-depth analysis of conservation variables in fluid mechanics and thermodynamics, analysis of state changes and compressibility, meaning of friction (dissipation) and entropy (irreversibility), 2nd law of thermodynamics, analysis of the boundary layer and impact on practical applications. Extended introduction to heat exchange, dimensional analysis, similarities, key figures, clockwise and counterclockwise thermodynamic cycles. (Entry requirement: TA.MA+PHY1_T)

THERMODYNAMICS AND FLUID DYNAMICS – SIMULATION (TA.THFL+SIM) ADVANCED   Numerical modeling and simulation with Matlab and CFD (Computational Fluid Dynamics). Definition/choice of model and system-boundary, meshing, boundary conditions and solver parameters, post-processing. (Entry requirement: TA.THFL)

USABILITY (TA.USAB) INTERMEDIATE   Physiology and psychology of human being, recognition and interpretation, GUI Design, usability and quality, usability methods and project integration, accessibility and user experience. (Entry requirement: I.IGL)

Project Modules

CONTEXT MODULE T1 (TA.KONTT1) BASIC   Step-by-step execution of a project by an interdisciplinary team of students, in product or process innovation coached by subject experts. Gain competences in the fields of project management, research, report writing and convincing presentations. (Entry requirement: none)

CONTEXT MODULE T2 (TA.KONTT2) BASIC   Building on Context Module T1, develop English for professional purposes, i.e. English communication skills, furthering presentation techniques and clear concise writing of documents; communicating in an international context, written correspondence, and making an elevator pitch. (Entry requirement: Context Module T1)

ENGINEERING PRODUCT DEVELOPMENT PROJECT 1 (TA.PDP1)
INTERMEDIATE   Engineering project: experiencing the development of a product in an interdisciplinary team. Elaboration of market and product requirements; develop, evaluate and verify engineering solution concepts taking into account established ideas- and solution-finding methods. Set-up of suitable basic tests and prototypes for proof of concept. (Entry requirement: TA.KONTT1, TA.KONTT2, TA.IGL or TA.ET+V or TA.TECHMECH)

ENGINEERING PRODUCT DEVELOPMENT PROJECT 2 (TA.PDP2)
INTERMEDIATE   Engineering project: experiencing the development of a product in an interdisciplinary team. Integrate the solution-parts to realize, test and demonstrate the overall system concept. Presentation and visualization of solutions, design concepts and the final result to the public. (Entry requirement: TA.PDP1)

INDUSTRIAL PROJECT (TA.PAIND) ADVANCED   Independent execution of an individual project within a company. Application and deepening of problem solving, project management and professional competencies under consideration of the systemic context. Creation of convincing scientific documentation and a presentation of the results. (Entry requirement: Junior student)

Brief Description of Modules

INTERNATIONAL PROJECT (TA.INTPRO) ADVANCED Hands-on introduction to the Design Thinking method. Execution of a design project within a team, solving a real life challenge provided by an industry partner. Application and deepening of problem solving, project management and professional competencies. Creation of convincing scientific documentation and a presentation of the results. (Entry requirement: Junior student)

Minor Modules

OPEN INNOVATION (TA.OPEN) INTERMEDIATE Learning the basic concepts of systematic ideation and the purposive use of technology. Practicing the methods of collaborative creativity. Discussing complex questions of partnership and intellectual property. Eventually, participating in a true innovation project. (Entry requirement: Junior student)

SWISSNESS – SWISS LANGUAGE AND CULTURE (TA.SWISS) BASIC Introduction to the culture of Switzerland: politics, the economy, languages, the arts, leisure and other aspects of Swiss culture are examined; foster an understanding of the host culture; includes 1–2 excursions and discussions with invited experts; competencies in methodological, social and academic aspects. (Entry requirement: none)

SWISSNESS AND GERMAN LANGUAGE A1 (TA.SWISS_GA1) BASIC Introduction to the culture of Switzerland: politics, the economy, languages, the arts, leisure and other aspects of Swiss culture are examined; foster an understanding of the host culture; includes 1–2 excursions and discussions with invited experts; competencies in methodological, social and academic aspects. German language competencies to understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type; able to introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. (Entry requirement: none)

Entry requirements:
Junior students will have completed the first half of their studies.
Where students have taken similar subjects to the reference module this will be taken in to consideration.

Language Modules

ENGLISH PROFICIENCY PREPARATION (TA.CPE_PREP) ADVANCED Strategies for understanding academic lectures, plus scientific and literary texts; extension of general and academic vocabulary; development of relevant verbal and written skills for studies and the workplace; preparation for the Cambridge Certificate of Proficiency in English. (Entry requirement: English C1)

(ENGLISH) TECHNICAL WRITING (TA.TECW) ADVANCED Individual coaching of students writing their academic technical report for the industrial project at English level C1-C2; inputs and exercises for the expansion and consolidation of academic writing skills such as structure and organization of reports, discussion of one's own and cited research findings, integration of graphics and data; academic and discipline-specific technical vocabulary and conventions. (Entry requirement: English C1)

GERMAN LEVEL A1 (W.SZ_DEUFF_A1) BASIC Can understand and use familiar everyday expressions and very basic phrases. Can introduce him/herself and others and can ask and answer questions about personal details. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help. Can write simple text such as postcards and can fill in forms with personal details. (Entry requirement: none)

GERMAN LEVEL A2 (W.SZ_DEUFF_A2) BASIC Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal information, employment). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can write simple message and very simple personal letters. (Entry requirement: German A1)

GERMAN LEVEL B1 (W.SZ_DEUFF_B1) INTERMEDIATE Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. Can describe experiences, dreams and ambitions and briefly give reasons and explanations for opinions and plans. Can write simple connected text on topics, which are familiar or of personal interest. (Entry requirement: German A2)

GERMAN LEVEL B2 (W.SZ_DEUFF_B2) INTERMEDIATE Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible. Can present clear, detailed descriptions and write clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options. (Entry requirement: German B1)

GERMAN LEVEL C1 (TA.DEFRC1) ADVANCED   Can understand a wide range of demanding, longer texts, and recognize implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can write clear, well-structured, detailed text on complex subjects, showing controlled use of organizational patterns, connectors and cohesive devices. (Entry requirement: German B2)

GERMAN LEVEL C2 (TA.DEFRC2) ADVANCED   Can understand with ease virtually every-thing heard or read. Can summarize information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations. (Entry requirement: German C1)

Intensive Week Modules

ASIA (TA.AS; ONE WEEK FULL-TIME) INTERMEDIATE   Asian countries, in particular India and China, continue to be growth markets – they are important partners for the Swiss economy. Their local culture and etiquette differ significantly from the western world. Introduction to the cultures and manners of China, India, Japan and Korea. (Entry requirement: none)

DESIGN, BUILD AND COMMISSION PHOTOVOLTAIC IN ETHIOPIA (TA.PV_HELP; TWO WEEKS FULL TIME)
INTERMEDIATE   Many Health Centers in Ethiopia are far from grid connections. Childbirth mortality at night and cooling of vaccines is a big challenge. A 5 kW decental Energy System, consisting of photovoltaic panels, batteries, and controls shall help. Participants team-up with local students from AMU (Arba Minch University) and learn together the sizing of the components at AST (Advanced Solar Training Center, carried out by professionals from Sahay Solar and Lucerne UASA). The learning and the equipment are then taken to a rural Health center, where the Energy system is constructed, commissioned and handed-over to the local operator.

ECOLOGY (TA.OEK; ONE WEEK FULL-TIME) BASIC   Relationships and life cycles in ecosystems, effects of climate gases on the environment and the atmosphere, eco-balances (e.g. regarding tourisme), and environmental policies and economics. Energy sources and a special emphasis to the scientific and technological background of nuclear and renewable energy sources, like wind, water, geothermal, and solar power and biomass. (Entry requirement: none)

LEADERSHIP (TA.LEAD; ONE WEEK FULL-TIME)
INTERMEDIATE   Leadership is understood, in this course, to include self-development, managing and leading others, and learning how a leadership vision is generated in challenging environments.

This is accomplished through self-assessments, and through critical examination of specific leaders and industry contexts. Each student is challenged to identify his/her leadership potential at a personal, organizational, and socio-political level. (Entry requirement: TA.MM+RW)

RECYCLING AND ITS IMPACT ON SUSTAINABILITY (TA.RECY; ONE WEEK FULL TIME) BASIC   Resource needs and energy use associated with products that are recycled worldwide. Answering questions such as: How sustainable are the technologies and practices employed in recycling? Can renewable energies and different business models make recycling more sustainable? How does recycling affect local and global carbon footprints? Based on case studies a framework is developed for a systems modelling approach to product cycles and recycles . (Entry requirement: none)

SALES MANAGEMENT (TA.DIST; ONE WEEK FULL TIME)
INTERMEDIATE   Inputs and business cases to understand, analyze, and optimize both distribution channels and sales organizations. Learn to lead, motivate and measure sales teams by setting appropriate objectives; to develop suitable sales strategies and tools; to understand and deploy key characteristics of sales psychology; to apply essential practices of sales psychology; to apply essential practices for sales control. (Entry requirement: TA.MM+RW and TA.IGM)

SUSTAINABILITY (TA.NA; ONE WEEK FULL-TIME) BASIC
Introducing important issues of economic, social and ecological sustainability such as added value, ensuring quality of life and protection of resources. Focussing on the question how sustainability, if taken seriously, influences our daily life and our use of products. Learning how to research and evaluate the life-cycle of everyday products with respect to sustainability. Being enabled to discuss and assess different models of behaviour in terms of sustainability, en-visaging different types of future product use. (Entry requirement: none)

TECHNOLOGY AND SOCIETY (TA.ME+TE; ONE WEEK FULL TIME) BASIC   Reflection of ethical and legal questions of the topic "Technology and Society"; knowledge-acquisition of this reciprocal relation; understanding of the idea, the origin, the significance and the justification of human rights as ethical frame of reference; recognizing human rights challenges and development of options of individual contribution to the realization of human rights. (Entry requirement: Junior student)

WINDPOWER AND ECOTECHNOLOGY (TA.WIND_ECO; ONE WEEK FULL TIME) INTERMEDIATE   Basics of wind energy engineering, starting with determination of wind power potentials, applied to kinds of turbines and systems including selection of materials and components up-to the estimation of electrical power production. Based on actual installations, establishing Eco-balances and environmental analyses as well as comparing methods for assessing the impact of emissions on humans, animals and nature. (Entry requirement: none)

Costs of living in Switzerland

Accommodations for students in Lucerne

Food, accommodation, and clothing can be costly in Switzerland. Nevertheless, your living expenses may vary greatly according to your own circumstances and lifestyle. The following estimates provide a general guideline:
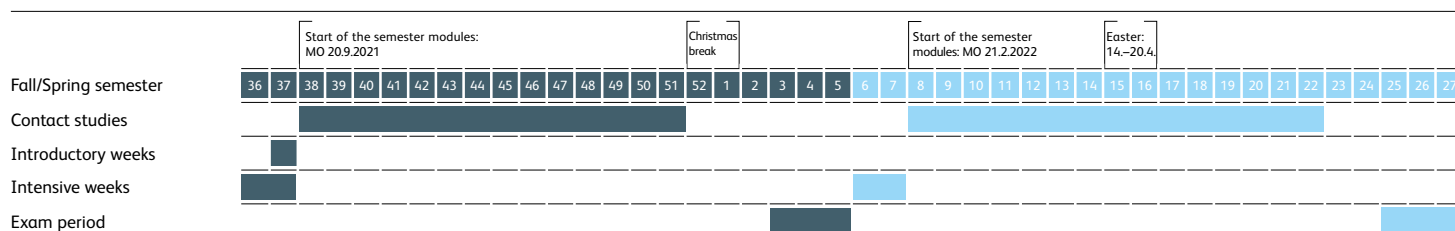
Offerings of the Lucerne University of Applied Sciences and Arts and places from local hosts.

Students are advised to search for accommodation in good time prior to arrival. The city of Lucerne and its suburbs offer various types of accommodation for students.

The International Office of Lucerne University of Applied Sciences and Arts is sharing the options at student houses on this site: www.hslu.ch/accommodation

Further assistance on choosing the right modules, housing, and logistics, please contact:
ea-international@hslu.ch
www.hslu.ch/ea-international

APPROXIMATE EXPENSES	CHF PER MONTH
Accommodation	400–800
Food	300–400
Public transportation	50–70
Course material	50–130
Health and third party liability insurance	80–100
Clothing, travelling, entertainment etc.	220–400
TOTAL	**1,100–1,900**

Schedule 2021/2022

Start of the semester modules: MO 20.9.2021 — Christmas break — Start of the semester modules: MO 21.2.2022 — Easter: 14.–20.4.

	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Fall/Spring semester																																												
Contact studies																																												
Introductory weeks																																												
Intensive weeks																																												
Exam period																																												

Attractive Location

Lucerne, nestled on the shores of Lake Lucerne and surrounded by alpine foothills, is the largest city in central Switzerland and a vibrant hub for tourism, culture, and education.

The city boasts a well-preserved medieval town center with several world-famous landmarks as well as modern infrastructure boasting a wide range of cinemas, museums, theaters, restaurants, sports facilities, and the world-famous Culture and Convention Centre KKL. In addition to offering an efficient, reliable, and safe public transportation system, Lucerne and the surrounding area are ideally suited to being explored by bicycle.

Thanks to its central location as well as its excellent highway and public transportation systems Lucerne is a convenient starting point for excursions to the rest of Switzerland and beyond. Two international airports in Zurich and Basel are each only about one hour's journey away.

The Lucerne School of Engineering and Architecture has its own modern campus in Horw, just 10 minutes from the center of Lucerne. Pleasantly situated amidst picturesque landscaped gardens, the campus is well equipped with state-of-the-art laboratories, lecture halls and class rooms, an up-to-date library, study areas, and a dining hall. The campus is easily accessible by both public transportation and bicycle. It is a short walk to the center of Horw, with its banking and shopping services, and Lake Lucerne, with its various sports facilities.

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