

Module manual Elective modules SS 2026

Sustainability Management & Technologies

Master full time

Study and examination regulations SPO 2025



Inhalt

1	Introduction.....	3
2	Description of Modules	5
2.1	Electives	5
	Advanced Economics	6
	Business Analytics & Artificial Intelligence	8
	Data Engineering and Analytics	10
	Energy Management and Energy Efficiency	12
	Environmental Law, Policies and Institutions	14
	Future Business Modelling.....	16
	Innovation Management Methods.....	19
	SUS - Social Impact, Sustainability and Compliance	22
	Strategic Foresight and Trend Analysis.....	24
	Technology Design and Evaluation	26

1 Introduction

This handbook describes all the electives that can be chosen within the Master's programme in Sustainability Management & Technologies in the **summer semester 2026**. The descriptions of the modules contain explanations about the requirements and types of module examinations.

How many electives do I have to choose?

You have to choose 2 electives during the entire course of the programme. You can choose electives in semester 2 and 3 of your studies (see figure with curriculum below). For the summer semester 2026, please choose **1 elective** from the electives listed in this handbook (unless you already completed 2 electives).

<i>1. Semester</i>		
Circular Economy and Life Cycle Management	Sustainability Business Basics and Economics	Sustainable Business Strategy and Entrepreneurship
Metrics and Analytics for Sustainability	Technology and Society	
<i>2. Semester</i>		
Artificial Intelligence and Sustainability	Sustainable Materials and Recycling- Technologies	Natural Resources Management and Supply Chain Sustainability
Values and Ethics for Sustainable Leadership	Elective I	
<i>3. Semester</i>		
Urban Ecology and Sustainable Building Technologies	Climate Change and De-Carbonization Technologies	Sustainable Investments and Finance Policies
Sustainability Project and Field Trip	Elective II	
<i>4. Semester</i>		
Master-Thesis		Master- Colloquium

Figure: Curriculum

Will all electives be taught at the Neuburg campus?

Some electives will be taught at the Neuburg campus, and some will be taught at the Ingolstadt campus. In the summer semester 2026, three electives will be taught at the Neuburg campus:

- Energy Management and Energy Efficiency (Dr. Khadijeh Khalili)
- Data Engineering and Analytics (Muhammad Uzair Akmal)
- Environmental Law, Policies and Institutions (NN)

The remaining electives in this module handbook will be offered at the Ingolstadt campus.

Please also note that available places in the electives offered at the Ingolstadt campus will be restricted, as they are modules offered from other study programmes (usually, 2-5 spots are available in the modules offered from other study programmes).

When and how can I sign up for an elective?

You will receive an e-mail notification from the Dean's office when and how you can sign up for your elective for the summer semester 2026. **Please check your THI mailbox regularly.**

Can I choose more than one elective in the summer semester 2026?

Yes, it is possible to sign up for more than one elective on a voluntary basis. Because of limited capacities, **you can choose only one elective during the registration process.** However, remaining spaces can be distributed at a later stage. In case you would like to complete more than one elective in the summer semester 2026, please **contact the respective lecturer at the beginning of the semester** to ask whether any remaining spaces are available. If spaces are available, it is possible to follow a second elective.

In case of questions about the contents of the electives, please do not hesitate to contact the Academic Director of the programme (Julia.Blasch@thi.de) or contact the respective lecturers directly.

In case of administrative and formal questions about the electives (e.g. exam registration and deregistration, registration of voluntary electives, transfer of credits etc.), **please contact the study administration at studienangelegenheiten@thi.de** directly.

Update status: 02/02/26

2 Description of Modules

2.1 Electives

Advanced Economics			
Module abbreviation:	Adv_Econ_M-EGM	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Electives	2
Responsible for module:	Eisenberg, Andrea		
Lecturer:	Eisenberg, Andrea		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		104 h
	Total:		151 h
Subjects of the module:	Advanced Economics		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
LN - written exam, 90 minutes			
Additional Explanation:			
None			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
The students get to			
<ul style="list-style-type: none"> • understand the importance of global economic system and problems for strategic business decisions in globally active companies. • be able to evaluate challenges resulting from globalization and growing international business transactions. • understand global economic problems, international economic relations and economic policy. • understand how the international monetary system works. • achieve an in-depth understanding of micro- and macroeconomic interrelationships. 			
Content:			
<ul style="list-style-type: none"> • Advanced Microeconomic theory: supply and demand, economic actors • Advanced Macroeconomics: inflation, unemployment, economic growth • Institutional economics and international economic organizations • International trade and globalization • Interest rates, international monetary policy and currency systems 			

Literature:

- MANKIW, Nicholas Gregory and Mark P. TAYLOR, 2023. *Economics*. Andover, Hampshire: Cengage. ISBN 978-1-4737-8698-1
- MCDOWELL, Moore, 2012. *Principles of economics*. London [u.a.]: McGraw-Hill Education. ISBN 0-07-713273-4, 978-0-07-713273-6
- TAYLOR, Timothy, 2022. *Principles of Economics. PDF* [online]. PDF e-Book.

Additional remarks:

The course is held on-site. However, under special circumstances, it may also take place virtually. Course selection varies depending on availability and demand. The actual selection for each semester can be found in the timetable. Courses may be canceled at the beginning of the semester. Participation is limited in some cases.

Business Analytics & Artificial Intelligence			
Module abbreviation:	BusAn_AI_M-EGM	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Electives	2
Responsible for module:	Ali, Faizan		
Lecturer:	Ali, Faizan; Bock, Jürgen		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		104 h
	Total:		151 h
Subjects of the module:	Business Analytics & Artificial Intelligence		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
LN - written exam, 90 minutes			
Additional Explanation:			
None			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students are able to</p> <ul style="list-style-type: none"> • explain the various conflict of objectives of supervised learning. • apply different models of supervised learning. • assess the quality of different models of supervised learning. • apply different clustering methods. • practically implement various machine learning methods using common software libraries. • distinguish between different areas of artificial intelligence and select suitable technologies for specific fields of application. • explain the basic principles and special concepts of formal knowledge representation. • transfer concrete domain knowledge into a formal knowledge model and provide added value through automatic reasoning. 			
Content:			
<ul style="list-style-type: none"> • Linear regression • Various classification algorithms • Various clustering techniques 			

- Artificial Neural Networks
- Implementation of Machine Learning algorithms using suitable software tools and libraries
- Definition of Artificial Intelligence and overview over subdisciplines
- Formal knowledge representation and automatic reasoning

Literature:

- JAMES, Gareth and others, 2021. *An introduction to statistical learning: with applications in R*. New York, NY: Springer. ISBN 978-1-0716-1417-4, 1-0716-1417-7
- BISHOP, Christopher M., 2016. *Pattern recognition and machine learning*. softcover reprint of the original 1st edition 2006. edition. New York, NY: Springer. ISBN 978-1-4939-3843-8
- POINTER, Ian, 2019. *Programming PyTorch for deep learning: creating and deploying deep learning applications*. Beijing, Boston, Farnham, Sebastopol, Tokyo: O'Reilly Media, Inc.. ISBN 9781492045328
- HITZLER, Pascal, Sebastian RUDOLPH and Markus KRÖTZSCH, 2010. *Foundations of Semantic Web technologies*. Boca Raton [u.a.]: Chapman & Hall/CRC Press. ISBN 978-1-4200-9050-5

Additional remarks:

The course is held on-site. However, under special circumstances, it may also take place virtually. Course selection varies depending on availability and demand. The actual selection for each semester can be found in the timetable. Courses may be canceled at the beginning of the semester. Participation is limited in some cases.

Data Engineering and Analytics			
Module abbreviation:	SMT_DataEngineering_Analytics_FW	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Specialised Elective Subject	
Responsible for module:			
Lecturer:	Akmal, Muhammad Uzair		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		103 h
	Total:		150 h
Subjects of the module:	Data Engineering and Analytics		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
<p>LN - project work</p> <p>Additional Explanation:</p> <p>This module is assessed through a project-based exam. Students work in groups of 3–5 on a shared project topic.</p> <p>Assessment components:</p> <ul style="list-style-type: none"> • Written report (group deliverable): One report per group, approximately 20-25 pages. • Oral presentation (individual assessment): Each student gives a 15-minute presentation. <p>Although the project is completed as a team, each student is assessed individually based on their personal contribution and presentation.</p>			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>By the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • design, implement, and evaluate end-to-end data architectures (including data ingestion, storage, processing, and access layers) that are scalable, fault-tolerant, and appropriate for analytical workloads. • develop, evaluate, and maintain automated data pipelines using modern data engineering tools and frameworks, ensuring data quality, reproducibility, and performance under real-world constraints. • select, apply, and critically assess descriptive, diagnostic, predictive, and prescriptive analytics methods to extract actionable insights from structured and unstructured data. 			

<ul style="list-style-type: none"> • combine data engineering practices with analytical modelling to solve complex, domain-specific problems, making informed trade-offs between accuracy, scalability, cost, and timeliness. • assess and manage data quality, security, privacy, and governance issues, including ethical and legal considerations, and justify design decisions in compliance with relevant standards and regulations. • communicate analytical results, system designs, and technical trade-offs clearly and persuasively to both technical and non-technical stakeholders using appropriate visualizations, documentation, and argumentation. • conduct a collaborative project in a group of peers. • effectively present the results of the group work and defend it against critical questions.
<p>Content:</p> <ul style="list-style-type: none"> • Introduction to Data Engineering and Analytics • Data Lifecycle, Architectures, and Infrastructure • Data Modelling, Database Design, and Storage Systems • Data Ingestion and Integration • Big Data Technologies • Data Warehouses, Data Lakes, and BI • Analytics Foundations and Visualization • Machine Learning for Analytics • Real-Time Analytics and Streaming Systems • Data Quality, Validation, and Monitoring • Data Governance, Security, and Ethics • Cloud Data Engineering • Operating Data Pipelines: DataOps, Orchestration, and Reliability • Designing Modern Data Platforms: Architecture, Automation, and Decentralization • Project Presentations and Discussion
<p>Literature:</p> <ul style="list-style-type: none"> • KLEPPMANN, Martin, 2017. <i>Designing Data-Intensive Applications</i> [online]. PDF e-Book. ISBN 978-1-4493-7332-0. • REIS, Joe , HOUSLEY, Matt, 2022. <i>Fundamentals of Data Engineering</i> [online]. <i>Plan and Build Robust Data Systems</i>. PDF e-Book. ISBN 9781098108304.
<p>Additional remarks:</p> <p>A maximum of 6 bonus points may be awarded to students who demonstrate outstanding classroom participation through case study discussions and topic-based presentations.</p> <p>The course is held on-site. However, under special circumstances, it may also take place virtually.</p> <p>Course selection varies depending on availability and demand. The actual selection for each semester can be found in the timetable. Courses may be canceled at the beginning of the semester. Participation is limited in some cases.</p> <p>This course takes place at the NEUBURG campus!</p>

Energy Management and Energy Efficiency			
Module abbreviation:	SMT_EnergyMgm_EnergyEfficiency_FW	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Specialised Elective Subject	
Responsible for module:			
Lecturer:	Khalili, Khadijeh		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		103 h
	Total:		150 h
Subjects of the module:	Energy Management and Energy Efficiency		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
LN - written exam, 90 minutes			
Additional Explanation:			
None			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
By the end of the course, students will be able to			
<ul style="list-style-type: none"> • audit and analyze: conduct professional-level energy audits using quantitative methods to identify efficiency potentials across thermal, electrical, and industrial systems. • design and integrate: develop holistic energy concepts that combine technical retrofits with renewable energy and sector-coupling strategies. • manage and standardize: plan and maintain an Energy Management System (EnMS) based on ISO 50001, utilizing key performance indicators (EnPIs) and continuous monitoring. • evaluate financially: perform life-cycle cost analyses and investment appraisals to justify the economic and ecological (CO₂) viability of efficiency projects. • navigate policy: interpret and apply national and EU energy regulations and funding schemes to ensure organizational compliance and leverage subsidies. • lead and communicate: drive organizational change through behavioral strategies and present high-level strategic reports to diverse stakeholders.. 			

Content:

- Global Energy Systems & Transition
- Energy Policy, Legal Frameworks & Funding
- Energy Management Systems (ISO 50001)
- Quantitative Audit Methodology
- Thermal Systems & Process Heat
- Electrical Systems & Power Quality
- Building Physics & HVAC (Commercial & Municipal)
- Compressed Air, Steam & Waste Heat Recovery
- Energy Performance Indicators (EnPIs) & Monitoring
- Behavioral Change & Organizational Culture
- Sector Coupling & Renewable Energy Integration
- Investment Appraisal & Life-Cycle Costing (LCC)
- Strategic Reporting & Stakeholder Management
- Integrated Energy Concept Presentation

Literature:

- ROOSA, Stephen A., DOTY, Steve, TURNER, Wayne C. , 2020. *Energy Management Handbook* [online]. PDF e-Book. ISBN 9788770222655.
- BHATTACHARJEE, Kaushik , 2018. *Industrial Energy Management Strategies Creating a Culture of Continuous Improvement* [online]. PDF e-Book. Available via: <https://doi.org/10.1201/9781003150961>.

Additional remarks:

Up to 6 bonus points can be achieved by voluntarily participating in group work or by giving short presentations throughout the semester.

The course is held on-site. However, under special circumstances, it may also take place virtually.

Course selection varies depending on availability and demand. The actual selection for each semester can be found in the timetable. Courses may be canceled at the beginning of the semester. Participation is limited in some cases.

This course takes place at the NEUBURG campus!

Environmental Law, Policies and Institutions			
Module abbreviation:	SMT_Environmental_Law_Policies_FW	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Specialised Elective Subject	
Responsible for module:			
Lecturer:	Suchithra		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		103 h
	Total:		150 h
Subjects of the module:	Environmental Law, Policies and Institutions		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
LN - oral exam, 15 minutes			
Additional Explanation:			
There will be an oral exam of 15 minutes offered in the exam period.			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
By the end of this course, students will be able to			
<ul style="list-style-type: none"> critically analyse national, European, and international environmental laws and policies, and interpret their implications for real-world environmental governance and decision-making contexts. apply environmental legal rules, policy instruments, and regulatory mechanisms to concrete case studies involving environmental protection, climate change, biodiversity, or resource management. assess the roles, mandates, and interactions of key environmental institutions (e.g. public authorities, courts, international organisations, NGOs, private actors) in policy design, implementation, and enforcement. integrate legal analysis with policy objectives and relevant environmental science knowledge to develop coherent, interdisciplinary solutions to complex environmental challenges. formulate legally sound and policy-relevant recommendations for organisations, public authorities, or stakeholders, taking into account feasibility, compliance, sustainability, and governance constraints. communicate complex environmental law and policy issues clearly and persuasively in written and oral formats, demonstrating the ability to argue positions grounded in legal reasoning and policy analysis. 			

Content:

- Introduction to Environmental Governance
- International Environmental Law
- European Union Environmental Policy
- Framework laws and sectoral laws (air, water, waste) in national legislation
- Environmental Institutions and Governance Structures
- Multi-level governance
- Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA)
- Climate Change Policy and Law
- Biodiversity and Conservation Law
- Pollution Control and Waste Management Regulations
- Environmental Justice and Human Rights
- Compliance, Enforcement, and Litigation
- Digitalization and Environmental Monitoring.

Literature:

- BREARS, Robert C., LINDLEY, Jade, 2025. *The Palgrave Handbook of Environmental Policy and Law* [online]. Cham: Springer Nature Switzerland PDF e-Book. ISBN 978-3-031-55387-5.

Additional remarks:

The course is held on-site. However, under special circumstances, it may also take place virtually.
Course selection varies depending on availability and demand. The actual selection for each semester can be found in the timetable. Courses may be canceled at the beginning of the semester. Participation is limited in some cases.

This course takes place at the NEUBURG campus!

Future Business Modelling			
Module abbreviation:	FuBuMo_M-GFT	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Electives	1
Responsible for module:	Wrobel-Wache, Stefanie		
Lecturer:	Wrobel-Wache, Stefanie		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		104 h
	Total:		151 h
Subjects of the module:	Future Business Modelling		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
LN - written exam, 90 minutes			
Additional Explanation:			
None			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
The students			
<ul style="list-style-type: none"> • are familiar with entrepreneurship-related theories, models, and ideas, and can reflect on what entrepreneurship is and what it means to develop an entrepreneurial mindset and culture. • know and can discuss the relationship and meaning of technological, social and environmental trends and scenarios with regard to business model development and innovation as well as the meaning of sustainability in the context of business development and risk management. • are familiar with digital, sustainable, disruptive and forward-looking business models, can explain the special features of each and give examples of successful business models. • know concepts of organisational resilience and can explain and discuss resilience in the context of entrepreneurship, business success and business modelling. • know the entrepreneurship process, business modeling tools and key factors of successful business models. • are able to develop future oriented business models by using different tools and methods. • know the meaning of uncertainty for corporates and entrepreneurs and approaches and methods to deal with uncertainty in the business context. • know the requirements for risk management and the four phases of risk management. 			

- can apply selected risk management tools and methods in the context of future oriented business modeling and develop an enterprise risk management system.
- can evaluate business models qualitatively and quantitatively.

Content:

General introduction

- Business Development, sustainability and future orientation of corporates

Introduction into Entrepreneurship

- Development of entrepreneurship as a research discipline
- Types of entrepreneurship
- Entrepreneurial mindset and culture
- Entrepreneurship process
- Business opportunities

Future oriented business modelling and business modelling tools

- Types of different business models (social, sustainable, digital, disruptive business models, business model patterns)
- Sources of business ideas, ideation, ideation tools
- Business modeling, business model innovation
- Business model evaluation
- Business planning
- Aspects of finance and accounting
- Risk management

Business environment and business organization

- Economic systems
- Technical, social and environmental environment
- Traditional and alternative business forms

Trends in entrepreneurship

- Dealing with global challenges, megatrends, VUCA and uncertainty (design thinking, lean startup approach, effectuation)
- Data driven business models
- Disciplined entrepreneurship

Literature:

- GEDEON, S., 2010. What is entrepreneurship?. In: *Entrepreneurial Practice Review*. **1(3)**, p.16-35.
- GASSMANN, Oliver, Karolin FRANKENBERGER and Michaela CHOUDURY, 2020. *The business model navigator: the strategies behind the most successful companies*. Harlow, England: Pearson. ISBN 978-1-292-32712-9, 1-292-32712-X
- OSTERWALDER, Alexander and Yves PIGNEUR, 2010. *Business model generation: a handbook for visionaries, game changers, and challengers*. Hoboken, NJ: Wiley. ISBN 978-0-470-87641-1, 0-470-87641-7
- RIES, Eric, 2019. *The lean startup: how constant innovation creates radically successful businesses*. London [u.a.]: Penguin Business. ISBN 978-0-670-92160-7
- SARASVATHY, Sara, 2001. Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. http://entrepreneurscommunicate.pbworks.com/f/2001_Sarasvathy_Causation+adn+effectuation.pdf. In: *Academy of Management Review*. **26(2)**, p.243-263.
- HAHN, Rüdiger, 2022. *Sustainability management: global perspectives on concepts, instruments, and stakeholders*. Fellbach: Rüdiger Hahn. ISBN 978-3-9823211-0-3, 3-9823211-0-7
- DUCHNEK, Stephanie, 2020. Organizational resilience: a capability-based conceptualization. In: *Business Research*. (13), p.215-246.
- AULET, Bill, 2013. *Disciplined entrepreneurship: 24 steps to a successful startup*. Hoboken, NJ: Wiley. ISBN 978-1-118-69228-8, 978-1-118-72088-2

- HUNZIKER, Stefan, 2021. *Enterprise Risk Management: Modern Approaches to Balancing Risk and Reward* [online]. Wiesbaden: Springer Gabler PDF e-Book. ISBN 978-3-658-33523-6. Available via: <https://doi.org/10.1007/978-3-658-33523-6>.
- OSTERWALDER, Alexander and others, 2014. *Value proposition design: how to create products and services customers want*. Hoboken, NJ: Wiley. ISBN 978-1-118-96805-5, 1-118-96805-0
- SCHIRMER, J., R. EBER and I. BOURDON, 2021. 32 ways to innovate business models through data: Emerging data-driven solution business model patterns from a study of 471 late stage data-driven startups. (<https://scholarspace.manoa.hawaii.edu/handle/10125/71226>). In: *Proceedings of the 54th Hawaii International Conference on System Sciences*, S. 4996-5005.
- UEBERNICKEL, Falk, JIANG, Li, BRENNER, Walter, PUKALL, Britta, NAEF, Therese, SCHINDLHOLZER, Bernhard, 2020. *Design thinking: the handbook* [online]. Singapore: World Scientific PDF e-Book. ISBN 978-981-120-215-5, 981-120-215-X. Available via: <https://doi.org/10.1142/11329>.
- VANINI, Ute, RIEG, Robert, 2021. *Risikomanagement: Grundlagen - Instrumente - Unternehmenspraxis* [online]. Stuttgart: Schäffer-Poeschel Verlag PDF e-Book. ISBN 978-3-7910-4527-6, 978-3-7910-4526-9. Available via: <https://doi.org/10.34156/9783791045269>.
- BULIGA, Oana, SCHEINER, Christian W., VOIGT, Kai-Ingo, 2016. Business model innovation and organizational resilience: towards an integrated conceptual framework. In: *J Bus Econ* (2016) 86:. (86), p.647–670.
- SOLTANIFAR, Mariusz, HUGHES, Matthew, GÖCKE, Lutz, 2021. *Digital entrepreneurship: impact on business and society* [online]. Cham, Switzerland: Springer PDF e-Book. ISBN 978-3-030-53914-6. Available via: <https://doi.org/10.1007/978-3-030-53914-6>.
- ZUCHELLA, Antonella, URBAN, Sabine, 2019. *Circular Entrepreneurship: Creating Responsible Enterprise* [online]. Cham: Palgrave Macmillan PDF e-Book. ISBN 978-3-030-18999-0. Available via: <https://doi.org/10.1007/978-3-030-18999-0>.

Additional remarks:

Additional literature and self-study resources will be announced and provided throughout the course.

The course is held on-site. However, under special circumstances, it may also take place virtually.

Course selection varies depending on availability and demand. The actual selection for each semester can be found in the timetable. Courses may be canceled at the beginning of the semester. Participation is limited in some cases.

Innovation Management Methods			
Module abbreviation:	InnoMaMeth_M-GFT	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Electives	2
Responsible for module:	Schönmann, Alexander		
Lecturer:	Schönmann, Alexander		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		103 h
	Total:		150 h
Subjects of the module:	Innovation Management Methods		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
LN - written exam, 90 minutes			
Additional Explanation:			
None			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
After attending the course, the students will have the following knowledge:			
<ul style="list-style-type: none"> • know modern methods for the creation, management and marketing of innovations and can explain them. • can propose appropriate innovation models based on industry and company size. • can name sources of innovation and know where and how to get inspiration. • design the implementation of workshops for eliciting requirements for product development. • know types of innovation processes and know how to design an innovation process. 			
Content:			
<ul style="list-style-type: none"> • Innovation Management and types of innovation • Component and architectural innovation • Sources of discontinuity • Patterns of innovation and lifecycle models (S-curve, Disruptive innovation, Hype Cycle) • Traditional and modern models of innovation (Technology Push, Market Pull, dominant design, interactive model, coupling model, networking model, Triple-Helix model, Quad-Helix model) • Open Innovation 			

- Frugal Innovation
- Reverse innovation
- Design-driven innovation
- New Service Innovation
- Lean Start-up
- Lean Innovation
- Value Innovation (Value Curve, Strategy Canvas)
- Product-Service-Systems (PSS)
- Market and customer research methods
- Innovation process design (linear Departmental-stage models, phase-review, simultaneous and concurrent process design, Lean Innovation)
- Stage-Gate-Process (Traditional Stage-Gate, Scalable Stage-Gate, next generation agile Stage-Gate)
- Creativity methods and tools for ideation and problem solving: questioning techniques (e.g. 5 Whys), Method of Focal Objects, Brainstorming, Idea Box/Morphological analysis, Six Thinking Hats, Inside-Out process
- Product Concept Generation: Need, Form, Technology, Business model
- Business Model Archetypes
- Sustainable Innovation
- Testing and Validation
- Agile management of innovation processes and projects
- Diffusion and marketing of innovations
- Case studies and industry examples on latest trends and technologies

Literature:

- TROTT, Paul, 2021. *Innovation management and new product development*. Harlow, England: Pearson. ISBN 978-1-292-25152-3
- TIDD, Joseph and John R. BESSANT, 2021. *Managing innovation: integrating technological, market and organizational change*. Hoboken, NJ: Wiley. ISBN 978-1-119-71330-2
- BIAZZO, Stefano, FILIPPINI, Roberto, 2021. *Product Innovation Management: Intelligence, Discovery, Development* [online]. Cham: Springer PDF e-Book. ISBN 978-3-030-75011-4. Available via: <https://doi.org/10.1007/978-3-030-75011-4>.
- KARAOMERLIOGLU, Dilek Cetindamar, Robert PHAAL and David PROBERT, 2016. *Technology management: activities and tools*. New York, NY: Palgrave Macmillan. ISBN 978-1-137-43185-1
- DORF, Richard C., 1999. *The technology management handbook*. Heidelberg: Springer. ISBN 3-540-64814-3
- SCHRAMM, Laurier L., 2018. *Technological innovation: an introduction* [online]. Berlin ; Boston: De Gruyter PDF e-Book. ISBN 978-3-11-042919-0. Available via: <https://doi.org/10.1515/9783110429190>.
- BESSANT, John R. and Joseph TIDD, 2015. *Innovation and entrepreneurship*. Chichester: Wiley. ISBN 978-1-118-99309-5, 978-1-119-08943-8
- SCHILLING, Melissa A., 2020. *Strategic management of technological innovation*. New York, NY: McGraw-Hill Education. ISBN 978-1-260-56579-9
- CHEN, Jin, BREM, Alexander, VIARDOT, Eric, WONG, Poh-Kam, 2019. *The Routledge companion to innovation management* [online]. London ; New York: Routledge PDF e-Book. ISBN 978-1-315-27667-0. Available via: <https://routledgehandbooks.com/doi/10.4324/9781315276670>.

Additional remarks:

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Lectures contain digital learning elements for self-study, such as learning videos or meetings via web conferences.

The examination can be held in digital form on a PC at the university campus.

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SUS - Social Impact, Sustainability and Compliance			
Module abbreviation:	GBU-SUS-SISC	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Electives	3
Responsible for module:	Loza Adai, Cristian Rolando		
Lecturer:	Loza Adai, Cristian Rolando		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		103 h
	Total:		150 h
Subjects of the module:	SUS - Social Impact, Sustainability and Compliance		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
Proj - Project work with oral presentation (15 min) and written elaboration (5 - 25 pages)			
Additional Explanation:			
None			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>This course broadens students' understanding of the evolving role of business in addressing societal challenges. Through a combination of theoretical exploration and action learning in collaboration with the Social Impact Start-Up Academy (SISTAC), students will gain critical knowledge and skills in social impact assessment, sustainability management, and compliance. The course emphasizes the practical application of concepts through real-world engagement with a social impact start-up.</p> <p>At the end of the course:</p> <p>Knowledge</p> <ul style="list-style-type: none"> • Students understand sustainability management principles and their practical application in global business contexts. • Students learn and apply diverse methods for assessing social impact. • Students demonstrate knowledge of global regulatory frameworks and compliance requirements relevant to international business operations. <p>Methodology</p> <ul style="list-style-type: none"> • Students deepen their understanding of global business management by engaging directly with a social impact start-up through hands-on collaboration. 			

- Students enhance their analytical skills by independently evaluating business models and developing actionable proposals that address social impact, sustainability, and compliance.
- Students analyze the influence of cultural and social factors on managerial interventions within the complex socio-economic systems of a social-impact start-up operating in a developing country.
- Students refine their proposals based on iterative feedback from stakeholders, ensuring alignment with the real needs of the start-up.

Personality

- Students strengthen an awareness of their role as change agents within the global business community and its significance for advancing sustainable development.
- Students enhance their capacity for self-reflection in the action-learning process.
- Students embrace sustainability as a personal and professional value, integrating it into their future endeavors.
- Students cultivate a strong ethical mindset, enabling responsible decision-making and business practices in diverse global contexts.

Social Competence

- Students develop strategies to effectively address the organizational challenges of working in groups.
- Students learn to communicate with sensitivity to intercultural differences and expectations.
- Students acquire the skills to effectively communicate the importance of sustainability, social responsibility, and compliance to internal and external audiences.
- Students evaluate critically and improve their debate, presentation, and communication skills through practice and reflection.

Content:

- Stakeholder capitalism and corporate purpose in the 21st century
- Foundations of sustainability and social impact
- Social Impact assessment tools and methods
- Sustainability management in practice
- Compliance and global regulatory frameworks
- Action learning: Social impact start-up collaboration

Literature:

- HAHN, Rüdiger, 2022. *Sustainability Management: Global perspectives on concepts, instruments, and stakeholders*. Fellbach: Rüdiger Hahn. ISBN 978-3-982311-0-3
- RASCHE, Andreas and others, 2023. *Corporate Sustainability: managing responsible business in a globalised world*. Cambridge: Cambridge University Press. ISBN 978-1-009-11492-9
- VANCLAY, Frank and Ana Maria ESTEVES, 2024. *Handbook of Social Impact Assessment and Management*. Cheltenham, UK: Edward Elgar. ISBN 978-1-80220-887-0
- SANDERS, Nada R. and John D. WOOD, 2015. *Foundations of Sustainable Business: Theory, Function, and Strategy*. Hoboken: Wiley. ISBN 978-1-118-44104-6
- YOUNG, Scott T. and K. Kathy DHANDA, 2013. *Sustainability: Essentials for business*. Thousand Oaks: Sage. ISBN 978-1-4129-8284-9
- RIDLEY-DUFF, Rory and Mike BULL, 2016. *Understanding Social Enterprise: Theory and practice*. London: Sage. ISBN 978-1-44629-553-3
- HAZENBERG, Richard and Claire PATERSON-YOUNG, 2022. *Social Impact Measurement for a Sustainable Future*. Cham: Palgrave Mcmillan. ISBN 978-3030-83152-3

Additional remarks:

The course is held on-site. However, under special circumstances, it may also take place virtually.

Strategic Foresight and Trend Analysis			
Module abbreviation:	StratFor_M-GFT	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Electives	1
Responsible for module:	Schwarz, Jan		
Lecturer:	Schwarz, Jan		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		104 h
	Total:		151 h
Subjects of the module:	Strategic Foresight and Trend Analysis		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
LN - oral exam, 15 minutes			
Additional Explanation:			
None			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
The students:			
<ul style="list-style-type: none"> • understand the most important foresight methods and can distinguish and explain them. • can apply the methods learned in case studies. • can methodically analyse trends and derive future developments. • are aware of challenges in future thinking and can address these. 			
Content:			
<ul style="list-style-type: none"> • Customer-, technology-, and competitor-foresight • Trend analysis and strategic early identification • Visioning • Strategic simulation methods • Prognostic crowdsourcing • Delphi method • Scenario technique • Trendreceiver method 			

<ul style="list-style-type: none"> • Analysis of Science Fiction
Literature:
<ul style="list-style-type: none"> • ELLER, E., HOFMANN, R., SCHWARZ, J.O., 2020. The Customer Foresight Territory. In: <i>Marketing Review St Gallen</i>. (3), p.888–895. • HEIJDEN, Kees van der, 2009. <i>Scenarios: the art of strategic conversation</i>. Chichester [u.a.]: Wiley. ISBN 0-470-02368-6, 978-0-470-02368-6 • KRUPP, Steven, Paul J. SCHOEMAKER and David J. TEECE, 2014. <i>Winning the long game: how strategic leaders shape the future</i>. New York: Public Affairs. ISBN 1-61039-447-X, 978-1-61039-447-5 • LIEBL, Franz, SCHWARZ, Jan Oliver, 2010. Normality of the Future: Trend Diagnosis for Strategic Foresight. In: <i>Futures</i>. (42 (4)), p.313-327. • ORIESEK, Daniel F., SCHWARZ, Jan Oliver, 2021. <i>Winning the uncertainty game: turning strategic intent into results with wargaming</i> [online]. London ; New York: Routledge PDF e-Book. ISBN 9781000289855, 9780367853594. Available via: https://doi.org/10.4324/9780367853594. • ROHRBECK, René, MENES ETINGUE, Kum, 2018. Corporate Foresight and Its Impact on Firm Performance: A Longitudinal Analysis. In: <i>Technological Forecasting and Social Change</i> . Volume 129(April), p.105-116. ISSN https://doi.org/10.1016/j.techfore.2017.12.013 • ROHRBECK, René, BATTISTELLA, Cinzia , HUIZINGH, Eelko , 2015. Corporate Foresight: An Emerging Field with a Rich Tradition. In: <i>Technological Forecasting & Social Change</i> . Volume 101(December), p.1-9. ISSN https://doi.org/10.1016/j.techfore.2015.11.002 • ROHRBECK, René, SCHWARZ, Jan Oliver, 2013. The Value Contribution of Strategic Foresight: Insights from an Empirical Study of Large European Companies. In: <i>Technological Forecasting and Social Change</i>. Volume 80(8), p.1593–1606. ISSN https://doi.org/http://dx.doi.org/10.1016/j.techfore.2013.01.004 • SCHOEMAKER, Paul J. and Robert E. GUNTHER, May 2013. <i>Profiting from uncertainty: strategies for succeeding no matter what the future brings</i>. New York: Atria Books. ISBN 978-1-5011-6175-9 • SCHWARZ, Jan Oliver, 2015. The ‘Narrative Turn’ in Developing Foresight: Assessing How Cultural Products Can Assist Organisations in Detecting Trends. In: <i>Technological Forecasting and Social Change</i>. (90 (Part B)), p.510–513. ISSN https://doi.org/http://dx.doi.org/10.1016/j.techfore.2014.02.024 • SCHWARZ, Jan Oliver, ROHRBECK, René, WACH, Bernhard , 2019. Corporate Foresight as a Microfoundation of Dynamic Capabilities. In: <i>FUTURES & FORESIGHT SCIENCE</i>. (e28)ISSN https://doi.org/10.1002/ffo2.28
Additional remarks:
No additional remarks.

Technology Design and Evaluation			
Module abbreviation:	TechDesEva_M-GFT	Reg.no.:	14
Curriculum:	Programme	Module type	Semester
	Sustainability Management and Technologies (SPO SS 25)	Electives	1
Responsible for module:	Schönmann, Alexander		
Lecturer:	Schönmann, Alexander		
Language of instruction:	English	Language of exam:	English
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Contact hours:		47 h
	Self-study:		104 h
	Total:		151 h
Subjects of the module:	Technology Design and Evaluation		
Lecture types:	SU/Ü - lecture with integrated exercises		
Availability of the module:	None		
Examinations:			
LN - written exam, 90 minutes			
Additional Explanation:			
None			
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
After attending the course, the students will have the following knowledge:			
<ul style="list-style-type: none"> • know and apply important methods of technology management and can explain them. • can propose appropriate technology development process models based on use case and company size. • evaluate technological solutions in a team and represent advantages and disadvantages for this. • design the implementation of workshops for eliciting requirements for development process models. • know the tasks of technology development and know how to manage R&D processes. 			
Content:			
<ul style="list-style-type: none"> • Modern technologies and technology trends • Organisation and role of Technology Management • Technology Dynamics (Lifecycle models) • Technology Intelligence (Technology scanning, Technology monitoring, Technology scouting, Technology identification, search field description) • Technology information sources (formal, informal sources) • Technology evaluation (maturity, potential, economic efficiency, Technology portfolio analysis) 			

- Technology planning (Roadmaps)
- R&D Management
- Technology development (Technology Stage Gate)
- Application-specific selection of adequate technologies
- Linking Technology development and Product development processes
- New Product development: Development strategies and degree of newness; “Valley of death”
- Product Development processes: e.g. V-Model, Spiral model, Lean Start-up, Trends in process design
- Quality Function Deployment
- Product Architecture: functional and physical elements (differential design vs. integral design), Types of modularity
- Role of design in the development process (e.g. DFX)
- Digital Technologies, Digital Ecosystems
- Biomimetics (learning from nature)
- Technology exploitation strategies
- Technology protection
- Case studies and Industry examples on latest trends and technologies

Literature:

- TROTT, Paul, 2021. *Innovation management and new product development*. Harlow, England: Pearson. ISBN 978-1-292-25152-3
- SCHUH, Günther, 2011. *Technologiemanagement* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-642-12529-4, 978-3-642-12530-0. Available via: <https://doi.org/10.1007/978-3-642-12530-0>.
- KARAOMERLIOGLU, Dilek Cetindamar, Robert PHAAL and David PROBERT, 2016. *Technology management: activities and tools*. New York, NY: Palgrave Macmillan. ISBN 978-1-137-43185-1
- SAVIOZ, Pascal, 2004. *Technology Intelligence: Concept Design and Implementation in Technology Based SMEs*. Softcover reprint of the original 1. edition. London: Palgrave Macmillan UK. ISBN 978-1-349-51002-3, 1-349-51002-5
- ULRICH, Karl T., Steven D. EPPINGER and Maria C. YANG, 2020. *Product design and development*. New York, NY: McGraw-Hill. ISBN 978-1-260-56643-7, 1-260-56643-9
- MARITAN, Davide, 2015. *Practical Manual of Quality Function Deployment* [online]. Cham [u.a.]: Springer International Publishing PDF e-Book. ISBN 978-3-319-08521-0, 978-3-319-08520-3. Available via: <https://doi.org/10.1007/978-3-319-08521-0>.
- EVERS, Natasha, James S. CUNNINGHAM and Thomas HOHOLM, 2021. *Technology entrepreneurship: bringing innovation to the marketplace*. London: Red Globe Press. ISBN 978-1-352-01117-3

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