

Prof. Dr.-Ing. Claus Lang-Koetz

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Advanced Technology & Innovation Management (MLICS5104)

Syllabus

Winter Term 2019/2020

Weekly hours:	2 (@45 minutes), however held 4 hours weekly in condensed form ("fast track") from Oct. – Dec. 2019
ECTS-Credits:	3
Workload:	90 hours, 30 hours within class and 60 hours for self-study
Time:	see LSF : Lecture will be held from Oct. – Dec. 2019
Begin:	30/09/2019
Level:	Master
Prerequisites:	Basic lecture on innovation management is recommended (such as BREM 3113 Technology and Innovation Management), but not required

Course content

The students are taught advanced topics within technology and innovation management, the respective theoretic background, practical application and relevance for companies. The lecture is a mixture of a classical lecture by the professor, group discussions and seminar. Concepts, process and methods are taught, seminar topics are researched and presented by the students. At the end, the results are delivered in a written seminar paper.

The students learn how an innovation management can be built up and which methods can be used for it. This comprises of activities for strategic planning, the generation of ideas, their assessment and selection, followed by their implementation into products and processes suitable for the market (see also preliminary schedule below).

A special focus is put on a strategic component (working with market and technology trends and future scenarios), the sources of innovations (taking open innovation approaches and collaboration with other organizations into account) and how to deal with ideas in the company and how to implement them (assessment and selection, technical implementation and market launch).

The course consists of classic lectures in order to convey concepts, processes and methods, group discussions and working independently on seminar topics in groups while presenting intermediary and final results in the classroom.

Possible seminar topics are (to be finalized later):

- Innovation ecosystems and the role of stakeholders: integrating different perspectives into the innovation process.
- Business model innovation for circular economy: how to find new ways to solve the customers' needs and offer solutions to reduce waste.
- „Cross-Industry Innovation“ - innovation through analogies und taxonomies.
- Technology foresight: identifying and assessing relevant future technologies with tools and expert involvement
- Sustainability-oriented innovation: how to find and implement solutions with a positive impact on sustainable development.
- Tackling the plastics challenge: novel ways to reduce plastic packaging

Preliminary schedule

The following schedule is planned for the lecture:

- Ch. 1: Introduction into technology and innovation management
- Introduction to seminar topics.
- Ch. 2: Foundations of technology management and technologies of the future
- Ch. 3: Sources of innovation: opportunities for innovation, knowledge push vs. need pull, users as innovators, recombinant innovation, design-led innovation, looking at innovation sources, absorptive capacity, tools and mechanisms to enable search
- Presentation first concept of seminar paper (by students)
- Ch. 4: Organization of innovation: innovation as a core business process: organizational principles, innovation process, learning to manage innovation, processes for new product development, measuring innovation success
- Ch. 5: Open innovation and innovation networks: Chesbrough's model of open innovation, the "spaghetti model" of innovation, different kind of innovation networks explained
- Q&A session for seminar topics
- Presentation intermediate results case studies
- Ch. 6: Intellectual Property Rights (IPR): IPR through registering patents, IPR that are inherent (design right, copyright), licensing
- Ch. 7: Market research and its influence on new product development: purpose of new product testing, techniques used in consumer testing of new products, market research and discontinuous new products, technology-intensive products, when it might be correct to ignore your customers
- Presentation final results case studies

Objectives

Participants that successfully complete the course will

- know the basic concepts of technology & innovation management, their relevance for companies and the most important concepts, methods and process,
- know how creativity and openness for new topics and ideas on the one hand and a well-structured methodological procedure on the other hand can contribute to the implementation of successful innovations,
- have gotten insights into company topics involved into innovation management (such as sales, marketing, production, development, ...) and will have learned about their perspective on innovation),
- be able to apply selected concepts and methods and know their strengths and weaknesses,
- be able to assume different perspectives on the topic in order to select suitable methods and concepts case by case.

Teaching and Learning Approach

The course is organized as a lecture with seminar elements. Throughout the course special emphasis is met on discussion and interaction with the students. We will critically discuss the theory, its practical application and its implications for use in an industrial company. Students will have to work on selected topics independently and present their results in class.

The materials – slides and questions & problems – will be distributed to the students on the e-learning platform.

I appreciate the interaction with students in class very much – it helps me to understand your thoughts and it helps you to better understand the topic. I invite you to actively “think along”, ask questions and discuss with me in the lecture!

Grading

The grading will be based upon

- A presentation and a written paper on a selected topic
- Active participation in class discussion

The following assessment scheme is applied:

- 'Sehr gut' represents exceptional work, far above average.
- 'Gut' represents good work, above average.
- 'Befriedigend' represents average work.
- 'Ausreichend' represents below average work with considerable shortcomings.
- And 'mangelhaft' is just exceptional work in the wrong direction or with unacceptable shortcomings.

It is my objective to grade everybody in the same, fair way. Equal performances are equally graded, no matter who the person is. Grade changes subsequently to their official publication are only made if I have made an obvious mistake. If I have done a mistake in the exam myself, this will not be to your disadvantage.

Literature

Recommended literature:

- Tidd, J.; Bessant, J. (2013): Managing Innovation: Integrating Technological, Market and Organizational Change, Wiley
- Smith, D. (2009): Exploring Innovation, McGraw-Hill Higher Education; 2nd edition
- Trott, P. (2012): Innovation Management and New Product Development, 5th edition, Financial Times Press
- Spath, D. et al. (2011): Technologiemanagement. Grundlagen, Konzepte, Methoden, Fraunhofer Verlag.

About the lecturer

Prof. Dr.-Ing. Claus Lang-Koetz is an Environmental Engineer and holds a PhD from the faculty of Mechanical Engineering at the University of Stuttgart. He worked in applied science at University of Stuttgart and Fraunhofer Institute for Industrial Engineering IAO in Stuttgart for 9 years. He then was Head of Innovation Management at Eisenmann SE, an international company making plant equipment and turnkey solutions for the automotive industry and the general industry. Since Sept 2014, he is professor for sustainable technology and innovation management at Pforzheim University.

Course contributions to master programs' common learning goals

Learning Objective / Outcome	Contributions to learning objectives	Assessment
<p>1 <i>Extending and consolidating Knowledge related to concepts and practical applications in Life Cycle Assessment and Sustainability Sciences</i></p> <p>The students have enlarged their knowledge of the bachelor study program concerning...</p> <p>1.1 the basics of the sustainability approach including characteristics of the relevant ecologic, economic and social perspectives</p> <p>1.2 They know important fields of application from technology and society and are able to formulate questions related to a sustainable development and to establish action strategies.</p> <p>1.3 They are familiar with concepts, norms and applications in the field of Life Cycle (ISO 14040ff.).</p> <p>1.4 They are able to identify possible solution approaches for theoretical or practical tasks in the field of eco-balancing, to assess the relevance and to critically analyze them in future.</p>	<p>Learning of the principles of green and sustainable innovation</p> <p>Understanding of the possibilities of technology towards fulfilling needs and requirements of consumers and customer</p> <p>Understand how to improve sustainability performance of products, processes and services by using methods of technology and innovation management</p>	<p>Questions in exam, presentation of case study topics, seminar paper handed in by students</p> <p>Questions in exam, presentation of case study topics, seminar paper handed in by students</p> <p>Questions in exam, presentation of case study topics, seminar paper handed in by students</p>
<p>2 <i>Systemic, analytic and instrumental/conceptual competences for the solution of theoretic and / or practice-oriented tasks in Life Cycle Assessments</i></p> <p>The MLICS Master students are able to...</p> <p>2.1 understand the complexity of specific scientific and/or practical tasks in the field of Life Cycle Assessment by using suitable models and concepts under consideration of given norms.</p> <p>2.2 Analyse them based on scientifically sound methods and</p> <p>2.3 Develop – based on the analysis results - independently, reflected recommendations / results on specific research questions or complex practical tasks based on empirical and/or theoretical evidences</p>	<p>Know how to relate influences of technology and innovation management on sustainability impact of products, processes and services</p>	<p>Questions in exam, presentation of case study topics, seminar paper handed in by students</p>
<p>3 <i>Communicative and social competences to convince third parties of the proposed solutions</i></p>		

	The MLICS Master students are able to ...		
3.1	Provide the independently elaborated solution approaches to third parties in a clear, concise and stylistically appropriate way.	Learn how to communicate with technical and marketing experts	Presentation and discussion of case study topics
3.2	Consider the appropriate formal guidelines for scientific solution concepts and	Learn how to frame a complex problem and describe solution approaches in a sound way	Presentation and written description of case study topics in seminar paper
3.3	Argue in a convincing manner by presenting their solution approaches comprehensible, differentiated and sufficiently documented.	Learn how to communicate with technical and marketing experts	Controversial discussion of critical topics in class (especially with relation to case study presentations)