Course

BAE5160 Managing of Emerging Technologies
4 SWS, 6 credits, English, advanced level
Thursday – 11:30 – 15:15
Further details to be announced via e-learning (sign in and check regularly)

Instructor

Prof. Dr. Bernhard Kölmel
(for more details: https://www.hs-pforzheim.de/profile/bernhardkoelmel/)
Office: T2.3.14,
Office hours: Tuesday 11:30 pm – 13:00 pm
E-Mail: bernhard.koelmel@hs-pforzheim.de (preferred mode of communication)

Prof. Dr. Thomas Schuster
(for more details: https://www.hs-pforzheim.de/profile/thomasschuster)
Office: W2.2.23,
Office hours: Wednesday 17:15 pm – 18:45 pm
E-Mail: thomas.schuster@hs-pforzheim.de (preferred mode of communication)

Lukas Waidelich (M.Sc.)
Office: T2.3.19,
Office hours: Individually after consultation
E-Mail: lukas.waidelich@hs-pforzheim.de (preferred mode of communication)

Moritz Gieza (M.Sc.)
Office: T2.3.17,
Office hours: Individually after consultation
E-Mail: moritz.gieza@hs-pforzheim.de (preferred mode of communication)

Overview

The course – a combination of lecture, workshops, case studies, and students' presentations - provides an advanced knowledge in Managing of Emerging Technologies.

Prerequisites

-

Learning objectives

This module provides a forum for the in-depth examination of strategic management topics organized around three themes: (1) the technology strategic management interface, (2) organizational innovation and (3) application of emerging technologies. The technology-strategic management interface is explored from two perspectives - an internal perspective that focuses on technology management issues, and an external perspective that focuses on the strategic implications of competing in advanced-technology industries. Organizational innovation is explored as a strategic adaptation mechanism that allows firms to effectively respond to the forces of technological change, and possibly to

create such change. The application of appearing technologies refers primarily to the use of IOT technologies, in which a practice-oriented assignment combines the facets of multiple emerging technologies. Case studies and readings are used to demonstrate the relevance of technology and innovation-related issues to the strategic management process.

Contribution to program goals

	Learning Objective	Contribution
1.1	Students are acquainted with numerous relevant management principles. They are able to explain and discuss them discerningly.	By the end of the course students should have a good understanding of the industry dynamics of technological innovation, including the role, drivers, and attributes of technological innovations, as well as of the main sources and types of innovation, standard battles and design dominance, and timing of entry.
1.2	Students are able to apply management principles within an organizational context.	By the end of the course students should have a good understanding of how to formulate a technological innovation strategy, including determining a firm's strategic direction, choosing innovation projects, evaluating collaboration strategies, and protecting proprietary technology.
1.3	Students are able to reflect discerningly and critically on diverse management principles within an organizational context.	
1.4	Students comprehend the challenges of ethics and sustainability for responsible business operations and are able to deal with them.	
2.1	Students are able to recognize and define problems as well as assess their importance.	
2.2	Students are able to analyse complex in-company and inter-company problems and challenges from different perspectives and/or within an international context.	
2.3	Students are independently able to develop creative solutions to complex in-company and inter-company problems and challenges.	By the end of the course students should have a good understanding of the key success factors in implementing a technological innovation strategy, including organizational structure, the new product development (NPD) process, NPD teams, and deployment strategy.
2.4	Students are successfully able to clarify complex problems and solutions to both experts and laymen.	
3.1	Students are acquainted with research methods relevant to engineering and management as well as their advantages and disadvantages.	By the end of the course students should have a good understanding of how the concepts learned in class apply in the business world. The discussion of cases is designed to help review, discuss, and understand the application of the main issues related to strategic management of innovation.
3.2	Students are successfully able to apply research methods relevant to engineering and management.	
3.3.	Students are able to implement relevant research methods in such a way as to deliver reliable and innovative results.	By the end of the course students should have a good understanding of how the concepts learned in class can be implemented in technical solutions.
4.1	Students possess expert knowledge in the engineering and business field and are able to provide integrated solutions to complex tasks.	By the end of the course students should have a basic understanding of how to deploy and manage derived solutions.
4.2	Students are proficient in the methods of project management and are successfully able to organize, conduct and manage projects.	By the end of the course students should have a basic understanding of the main elements that determine teamwork performance, including communication, collaboration, and task accomplishment. Teams

	Learning Objective	Contribution
		formed at the beginning of the semester will work to-gether in case in-class preparation, take-home, written tests, and project and presentation preparation.
4.3	Students are able to develop and assess alternative solutions taking diverse disciplines into account and apply them to integrated comprehensive solutions.	

Teaching and learning approach

The teaching and learning approach is based on 3 didactical methods:
The theoretical key knowledge and the basic concepts are thought at the lecture. The students gain the methodology and the guidance to know and to implement the introduced concepts and tools. Questions and comments of the students are welcome during the lecture.
After the lecture the students should reflect and sum up the content of the lecture based on course materials provided.
The theoretical knowledge is enlarged and converted into a practical role by workshops and case studies. An active participation in class is an important part of the teaching and learning approach.
The students can always communicate with the instructor and get support and advice by talking or mailing.

Exam Requirements

The examination is divided into two parts: a theoretical elaboration and a practical project. Basically, the following requirements will be graded each separately, and on that basis an average grade per person will be built by the professor:
Active general participation during lectures, and especially in brainstormings, workshops, and case studies.
Individual roles prepared and actively performed in group(s) during workshops and case studies, as defined by and agreed with the professor.
Individual or group voluntary activities/ presentations, as required by or agreed with the professor – as far as reasonably possible.
Maximum 2 lectures (180 minutes each) missed during the course. More absence must be agreed with the professor and be compensated.

Grading, based on exam results:
Class contribution will be graded based on participants' ability to listen, willingness to interact with other class members, presentation of points relevant to the discussion, additions to the understanding of situations discussed, distinction among different kinds of data, and study of situations, versus mere repetition of facts without analysis or conclusions

'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.
‚Mangelhaft' is just exceptional work in the wrong direction or with unacceptable shortcomings.

Course materials

- Schilling, M. A. (2012): Strategic Management of Technological Innovation, 4. Auflage. McGraw-Hill Education.
- Vong, J./ Song, I. (2015): Emerging Technologies for Emerging Markets, 11. Auflage. Springer: Heidelberg.
- Schuh, G./ Klappert, S. (2011): Technologiemanagement: Handbuch Produktion und Management 2, 2. Auflage. Springer: Heidelberg.
- Wördenweber, W. (2008): Technologie- und Innovationsmanagement, 3. Auflage. Springer: Heidelberg.
- Meissner, D. et al. (2019): Emerging Technologies for Economic Development, 1. Auflage. Springer: Heidelberg.
- Class handouts will be available in the LMS.

My teaching philosophy

In the (digital) classes we consider the important concepts, models, principles and phases of strategic and operational management and apply them on a real world situation. We will assist you to develop a self-contained strategic thinking, based on the acquired basic skills, and to evaluate the opportunities and the threats of different strategies and management methods. When you don't understand a learning step, you should pose a question during the lesson or afterwards. We want to support every student who is committed to take the required knowledge and to pass the exams successfully.

Tentative Schedule (changes tba)

Date	Topic
Lecture 1	Industry Dynamics of Technological Innovation
Lecture 2	Emerging Technologies Radar
Lecture 3	Formulating Technological Innovation Strategy
Lecture 4	Formulating Technological Innovation Strategy
Lecture 5	Implementing Technological Innovation Strategy
Lecture 6	Implementing Technological Innovation Strategy
Lecture 7	Basics of Cloud Computing
Lecture 8	Data Analytics
Lecture 9	Web Services & IoT
Lecture 10	Basics of Blockchain /DLT
Lecture 11	Basics of Blockchain /DLT
Lecture 12	Basics of AI
Lecture 13	Basics of AI
Lecture 14	Introduction to additive manufacturing
Lecture 15	Group Work
Lecture 16	Group Work
Lecture 17	Group Work
Lecture 18	Group Work
Lecture 19	Group Work
Lecture 20	Group Work
Lecture 21	Group Work
Lecture 22	Group Work
Lecture 23	Case Presentations
Lecture 24	Case Presentations