ENGINEERING PF
SCHOOL OF ENGINEERING
Fakultät für Technik
Hochschule Pforzheim

HS PF

Syllabus

BAE5160 Managing of Emerging Technologies

Prof. Dr. Bernhard Kölmel, Dr. Michael Krutwig

Summer Semester 2024

Level	Master	
Credits	6 Credits,	
Student Contact Hours	4	
Workload	180 hours	
Prerequisites	Completed Bachelor	
Time	s. LSF	
Room	s. LSF	
Start Date	s. LSF	
Lecturer(s)	**Name**	Prof. Dr. Bernhard Kölmel Dr. Michael Krutwig
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Summary

The Managament of Emerging Technologies module is designed to introduce students to emerging technologies. In addition to the theory, the students should simultaneously have the possibility to experience the technologies in practice within the framework of a comprehensive project work. For this purpose, an IoT construction kit will be used to introduce the various new technologies to the students. Cooperation with regional players will also be built upon. Parallel to this, the students are to provide scientific project support and publish the results towards the end of the semester.

Outline of the Course

Students will learn the following subject matter in the module:

- Additive manufacturing
- Cloud Computing
- Iot-Technology
- Visualization Technologies
- Use-Cases
- Cooperation with administration and companies
- Scientific work
- Project Documentation

Course Intended Learning Outcomes and their Contribution to Program Intended Learning Outcomes / Program Goals

Technical Concepts BAE5161

Program Intended Learning Outcomes		Course Intended Learning Outcomes
	After completion of the program the students will be able…	**After completion of the course the students will be able…**
1	**Responsible leadership in organizational contexts**	
2	**Creative problem solving skills in a complex business environment**	
2.1	…to recognize and define problems as well as assess their importance.	…to use new technologies in a problem identification / -demarcation & -classification.
2.2	…to analyse complex in-company and inter-company problems and challenges from different perspectives and/or within an international context.	...to use new technologies for a problem analysis.
2.3	…to independently develop creative solutions to complex in-company and inter-company problems and challenges.	...to use new technologies as an approach to creative problem solving.
2.4	…to clarify successfully complex problems and solutions to both experts and laymen.	
3	**Creative problem solving skills in a complex business environment**	
3.1	…to demonstrate their knowledge of research methods relevant to engineering and management as well as their advantages and disadvantages.	...to explain basic concepts of technology management case studies.
3.2	…to successfully apply research methods relevant to engineering and management.	...to use the concepts of the construction-oriented research approach. They can design and test innovative artifacts and corresponding action systems.
3.3	…to implement relevant research methods in such a way as to deliver reliable and innovative results.	...to apply the basic concepts of emergent technology management. You will be able to design and implement a technical prototype.
4	**Interdisciplinary and integrative work**	
4.1	…to apply their expert knowledge in the engineering and business field and to provide integrated solutions to complex tasks.	...to provide an overview on the international development of essential new technologies.
4.3	…to develop and assess alternative solutions taking diverse disciplines into account and apply them to integrated comprehensive solutions.	...to use emergent technologies to design and implement future-oriented technical prototypes and evaluate them using business design methods.

Organizational concepts BAE5162

Program Intended Learning Outcomes		Course Intended Learning Outcomes
	After completion of the program the students will be able…	**After completion of the course the students will be able…**
1	**Responsible leadership in organizational contexts**	
2	**Creative problem solving skills in a complex business environment**	
2.1	…to recognize and define problems as well as assess their importance.	...to understand the organizational concerns in a technical problem identification/demarcation & classification.
2.2	…to analyse complex in-company and inter-company problems and challenges from different perspectives and/or within an international context.	...to embed a problem analysis in the corporate context
2.3	…to independently develop creative solutions to complex in-company and inter-company problems and challenges.	...to use new technologies as an approach to creative problem solving for business models.
3	**Creative problem solving skills in a complex business environment**	
3.1	…to demonstrate their knowledge of research methods relevant to engineering and management as well as their advantages and disadvantages.	...to introduce basic concepts of technology management and explain the management of new technologies using case studies.
3.2	…to successfully apply research methods relevant to engineering and management.	...to use concepts of the construction-oriented research approach. They can design and test innovative artifacts and corresponding action systems.
3.3	…to implement relevant research methods in such a way as to deliver reliable and innovative results.	..to apply the basic concepts of emergent technology management. You will be able to design and implement a technical prototype.
4	**Interdisciplinary and integrative work**	
4.1	…to apply their expert knowledge in the engineering and business field and to provide integrated solutions to complex tasks.	...to provide an overview on the international development of essential new technologies and relevant economic fields of application.
4.3	…to develop and assess alternative solutions taking diverse disciplines into account and apply them to integrated comprehensive solutions.	...to use emergent technologies to design and implement future-oriented technical prototypes and evaluate them using business design methods.

Teaching and Learning Approach

The teaching and learning approach are 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.

Literature and 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.

Assessment

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.

Schedule

Lecture	Prerequisites	Topics	Hints
1	-	Industry Dynamics of Technological Innovation	Organisation
2	Previous lecture unit	Emerging Technologies Radar	
3	Previous lecture unit	Formulating Technological Innovation Strategy	
4	Previous lecture unit	Formulating Technological Innovation Strategy	
5	Previous lecture unit	Implementing Technological Innovation Strategy	
6	Previous lecture unit	Implementing Technological Innovation Strategy	
7	Previous lecture unit	Basics of Cloud Computing	
8	Previous lecture unit	Data Analytics	
9	Previous lecture unit	Web Services & IoT	
10	Previous lecture unit	Basics of Blockchain /DLT	
11	Previous lecture unit	Basics of Blockchain /DLT	
12	Previous lecture unit	Basics of AI	
13	Previous lecture unit	Basics of AI	
14	Previous lecture unit	Introduction to additive manufacturing	
15	Previous lecture unit	Group Work	
16	Previous lecture unit	Group Work	
17	Previous lecture unit	Group Work	
18	Previous lecture unit	Group Work	
19	Previous lecture unit	Group Work	
20	Previous lecture unit	Group Work	
21	Previous lecture unit	Group Work	

22	Previous lecture unit	Group Work	
23	Previous lecture unit	Case Presentations	
24	Previous lecture unit	Case Presentations	

Academic Integrity and Student Responsibility

The lecturer welcomes students to exchange ideas about the content of the course. When problems and questions arise, fellow students can make a valuable contribution to increasing their own understanding.

Code of Conduct for Students

- Punctuality at the lecture
- Have curiosity and interest in the lecture content
- Think independently in the lecture
- Attend the lecture and actively participate in it
- Consult additional literature for the lecture

Link to the Code of Conduct for online Teaching

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.