SYLLABUS

COURSE BLOCK B	**Emerging Technologies and Innovative Laser-based Production Facilities**
COURSE	**Emerging Technologies**

30 contact hours (as a part of 45 contact hours for the course block B)
3 credits (in total for the course block B)

LECTURERS

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)

OVERVIEW

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

PREREQUISITES

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LEARNING OBJECTIVES

This module provides opportunities to explore emerging technologies and understand the underlying technical concepts. Emerging technologies are characterized by novelty, relatively fast growth, prominent impact, and uncertainty. They are the tools that enable upstarts to disrupt whole industries.

The module explores the current and potential future impacts of new, emerging, and rapidly evolving technologies on organizations and their operations across a range of industries and sectors with a focus on high-tech-industries (i.e. Automotive industry).

During the course, we will develop an understanding of enabling technologies, their impact on business, and applicability in different business scenarios as well as how to ensure their scalable implementation and proper architecture planning.

Trends and evolution of technologies

- Rethinking product development: Lean Startup, Design Thinking, Jobs to be done; A/B testing, Analytics, Data Science, Big Data
- Rethinking product engineering: Agile, DevOps, Continues Delivery; Micro-services, Containers & their orchestration, Cloud, Serverless
- Rethinking user experience: Modern web, mobile, wearables, conversational interfaces, omnichannel
- Mechanics of digital disruption
- Introduction to Cloud Computing / multi-cloud & hybrid cloud strategies (AR/VR & Computer Vision
- Internet of Things/Edge Computing
- 3D Printing
- Quantum Computing
- AI, Machine Learning, Big Data

At the end of this course, the students should be able to:

- understand the technical basics of important emerging technologies
- form a holistic picture of the role of technologies in future-oriented business
- reason about the applicability of particular technology in a business context
- work on a technology strategy
- effectively collaborate with technical departments and/or external vendors.

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.

COURSE MATERIAL

- Future Today Institute (2021): Tech Trends Report
- 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.
- Meissner, D. et al. (2019): Emerging Technologies for Economic Development, 1. Auflage. Springer: Heidelberg.
- Class handouts will be available in the LMS.

FINAL EXAMINATION

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.

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

'A' represents exceptional work, far above average. (excellent)
'B' represents good work, above average. (good)
'C' represents average work. (average)
'D' represents below average work with considerable shortcomings. (below average)
‚F' is just exceptional work in the wrong direction or with unacceptable shortcomings. (fail)

PLANNED SCHEDULE

- Industry Dynamics of Technological Innovation
- Emerging Technologies Radar and Future Technologies
- Formulating Technological Innovation Strategy
- Implementing Technological Innovation Strategy
- Technological basics of Cloud Computing (Architecture)
- Technological basics of IoT
- Technological basics of Blockchain /DLT
- Technological basics of AI
- Introduction to additive manufacturing
- Implementation of practical solutions

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.