Module DDM 4209 - Design for Manufacturing

1	Module Number	Study Programme	Semester	Offered in	Duration	Module Type	Workload (h)	ECTS Points
	4209	DDM	2	☐WS ☒SS	1 Semester	compulsory	240	8

2	Courses	Teaching and Learning Forms	Contact Time (SWS)	Contact Time (h)	Self-Study Time (h)	Language
	a) a) Production-oriented Product Design	Lecture	6	90	120	English
	b) Product Life Cycle Management	Lecture plus Virtual Laboratory	2	30		

3 **Learning Outcomes and Competences**

Once the module has been successfully completed, the students can...

Knowledge and Understanding

- Explain the basic procedure of the design for manufacturing and understand the connections within the design for manufacturing.
- Describe technical basics of the manufacturing processes
- Basic knowledge in the design for manufacturing.
- Recognize the significance of the design for manufacturing.
- Understand welding of materials, root cause investigations and polymer manufacturing processes.
- Understand and explain welding of materials, root cause investigations and polymer manufacturing processes.

Use, Application and Generation of Knowledge

Use and Transfer

- Apply technical laws.
- Create technical reports and presentations.
- Analyse technical solutions.
- Recognize and classify connections.
- Understand the basics of the subject.
- Analyse technical problems and derive or develop solutions.
- Take different perspectives and points of view on a given situation, weigh them up against each other and make an assessment.
- Design of products.
- Calculate simulate models to optimise manufacturing processes and parts.
- Familiarize themselves with new ideas and topics based on their basic knowledge.

Scientific Innovation

- Use methods and tools to gain new insights in the field of manufacturing.
- Create new models to develop new manufacturing processes and parts.
- Optimize systems.
- Set up hypothesis tests.
- Independently develop approaches for new concepts and assess their suitability.
- Develop concepts for the optimization of technical applications.
- Improve applications in respect of the manufacturing process.

Communication and Cooperation

- Communicate actively within an organization and obtain information.
- Interpret the results of the field and draw admissible conclusions.
- Use the learned knowledge, skills and competences to evaluate the manufacturing processes and interpret them according to other aspects.
- Present technical contents regarding to manufacturing processes and discuss them.
- Communicate and cooperate within the group in order to find adequate solutions for the task at hand.

Scientific Self-Conception/ Professionalism

- Derive recommendations for decisions from a social and ethical perspective on the basis of the analyses and evaluations made.
- Justify the solution theoretically and methodically.
- Reflect and assess one's own abilities in a group comparison.

4	**Contents** a) Production-oriented Product Design: Part 1: Root cause investigation: root cause investigation on failing products with the aim to identify failures in production oriented product design, 4 to 6 cases, ambivalent data situation, insufficient information, without obviously correct answers and a ticking clock, which requires fast actions, inter-cultural investigation teams. Part 2: Basics (process, weldability of materials and design) for relevant joining technologies (e.g. laser beam welding, resistance welding, friction welding, ultrasonic welding, mechanical joining, adhesive bonding), methods of quality assurance in production, health and safety instruction, industrial applications, practical laboratory Part 3: Textile techniques, composite design, production of preforms, thermoplastic and thermoset processes, organic sheet moulding, taping, resin transfer moulding, reactive injection moulding, polymer press processes, repairing of composite materials, joining of polymer materials b) Product Life Cycle Management: Understanding the method LCA Life Cycle Assessment, trends in industry and society, training and application LCA software GaBi; executing an LCA in teams; Analysing industrial LCAs
5	**Participation Requirements** Compulsory: Bachelor Degree in Automotive or Mechanical Engineering Recommended: NA
6	**Examination Forms and Prerequisites for Awarding ECTS Points** Written exam, 120 minutes, graded Product Life Cycle Management: Individual semester project
7	**Further use of Module** -
8	**Module Manager and Full-Time Lecturer** Responsible: Prof. Dr.-Ing. Matthias Deckert Lecturer: Prof. Dr.-Ing. Matthias Deckert, Prof. Dr.-Ing. Alexander Friedrich, Prof. Dr.-Ing. Martin Greitmann, Prof. Dr.-Ing. Stefan Rösler
9	**Literature** Lecture documents, ISO 14040/14044, LCAs
10	**Last Updated** 08.06.2021