Module name	Sustainable production through sustainable product design				
Module name english	Sustainable Production by Sustainable Product Design				
Person responsible for the module	Prof. Dr.-Ing. Thomas Weiler				
Lecturer	Prof. Dr.-Ing. Thomas Weiler				
Event language/s	English				
Identification number **t.b.d.**	**Workload** **180 h**	**Credits** **6**	**Semester of study** **From the 5th semester**	**Frequency of the offer** **annually to the Winter term**	**Duration** **1 semester**

1	**Course**	**Contact time**	**Self-study**	**Planned group size**
	Lecture: 3 SWS **Exercise: 1 SWS**	**4 SWS (= 60 h)**	**Total: 120 h**	**Lecture: max. 60** **Exercise: max. 15**

2 Learning outcomes / Competencies

The students...

- **know the global motives for the development of sustainable products**
- **know the targets of sustainability, e.g. resource efficiency, CO_2 neutrality**
- **know innovative products with a high sustainability character**
- **know strategies and methods of eco-design to develop sustainable products and can apply them**
- **Understand the interdisciplinary interlocking between material, design, manufacturing and costs in relation to sustainability and the resulting restrictions and innovation potentials**
- **know sustainable materials as well as their specific advantages and disadvantages and can apply them in new product designs**
- **are familiar with sustainable manufacturing processes and their specific advantages and disadvantages and can apply them to new product designs**
- **know sustainable designs and their specific advantages and disadvantages and can apply them in new product designs**
- **Understand the impact of product design changes on the environment**
- **can perform cost analyses on products**

Soft Skills:
The students...

- **can deal with current literature in the English language**
- **can work in groups on the topic of sustainable product development**
- **can express themselves in English on the subject of sustainability**

3 Contents

- **Sustainability targets**
- **Structure and functioning of modern sustainable products**
- **Historical and current technological developments of sustainable products**
- **Methods of eco-design**

	• **Technological and economic interactions between material, manufacturing process, design and cost** • **Transformation processes from traditional to sustainable products** • **Contents of the module units:** **1) Motivation, basics and requirements** **2) The end of life of a product** **3) Disassembly of products** **4) Sustainable assembly techniques** **5) Sustainable manufacturing techniques** **6) Sustainable constructions** **7) Sustainable materials** **8) Evaluation methods for product designs** **9) Future measures for sustainable products** **10) Guest lecture from the industry** **Definitions:** **Sustainable product design is defined in this module as a holistic design approach to create energy and resource efficient, recyclable products by holistically considering material, manufacturing and assembly choices in an appropriate component design that meets all sustainability requirements.**
4	**Teaching forms** **Lecture with accompanying exercise** **Exercise Topic:** **Purchase and disassembly of a modern product in teams of 4 with subsequent analysis in terms of sustainability from 4 points of view:** **1) Materials** **2) Manufacturing process** **3) Construction** **4) Economic efficiency**
5	**content-related prerequisites for participation** **Production processes, design engineering and materials science**
6	**formal prerequisites for participation** **none**
7	**Forms of examination** **Written exam (70%)** **Presentation of exercise results (30%)**
8	**Prerequisite for the award of credits** • **passed oral exam** • **passed presentation of the exercise results**

9	**Use of the module in:** **Course of studies** **Status** **Mechanical engineering (incl. monoeducational variant)_BPO2018 Elective module** **Industrial Engineering Mechanical Engineering_BPO2018 Elective module**
10	**Importance of the grade for the final grade** **The weighting results from the share of credits of the module in the total number of grade-relevant credits**
11	**Other information / literature** **Ashby M. F.: Materials Selection in Mechanical Design, Elsevier** **Herrmann C.: Holistic Life Cycle Management - Sustainability and Life Cycle Orientation in Companies, Springer.** **Vajna S.: Integrated Design Engineering, Springer** **Lachmayer R., Rettschlag K., Kaierle S. (Eds.): Design for Additive Manufacturing, Springer.** **Herrmann C., Pries H., Hartmann G.: Energy- and resource-efficient production. from aluminum die casting, Springer** **Sapuan S.M., Mansor M.R.: Design for sustainability green materials and processes, Elsevier.**