

Vehicle Constructions and Assembly Technology

Code: MK3JSZTG05G317-EN

ECTS Credit Points: 5

Evaluation: mid-semester grade

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): Manufacturing Processes II

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

This series of lectures is based on the fundamental machine constructions taught in the machine elements course. It reviews the build-up of a road vehicle and the construction of main units such as a drive train with rear-wheel and a front-wheel drive and its parts (transmission, transaxle, clutch, differential), suspension and steering systems, braking systems (disc brake, drum brake, brake booster).

In the second part of the subjects the students learn the assembly operations and the theorem of designing assembly systems. They will learn the assembly possibilities of machine elements. On the seminar they will use CAD software for geometric modelling and assembly operation planning.

Literature:

Compulsory:

- Julian Happian-Smith PhD, MSc, BTech (Editor) An Introduction to Modern Vehicle Design, ISBN 07506 5044 3, Cert Ed HE, MSAE Oxford, Reed Educational and Professional Publishing Ltd, 2002
- Peter Girling (Editor): Automotive Handbook, VDI-Verlag GmbH, ISBN 3-1-419115-X, 1993
- [Ho, William, Ji, Ping](#): Optimal Production Planning for PCB Assembly, Springer Verlag, 2010, ISBN 9781849966139
- Botti, Vicent; Giret, Adriana: [ANEMONA: A Multi-agent Methodology for Holonic Manufacturing Systems](#), Springer Verlag, 2008, ISBN 9781848003095
- Wu, Bin: [Handbook of Manufacturing and Supply Systems Design: From Strategy Formulations to System Operation](#), Taylor & Francis, 2001, ISBN 9780415269025

Recommended:

- Fritz Klocke: *Manufacturing Processes I, Cutting*, RWTH Edition, RWTH Aachen University, p. 524, ISBN 978-3-642-11978-1
- John A. Schey: *Introduction to Manufacturing Processes*, McGraw – Hill Book Company, 1977., p. 392., ISBN 0-07-055274-6
- J. T. Black, Ronald A. Kohser: *Materials and Processes in Manufacturing*, Tenth Edition, United States of Amerika, p. 1033, ISBN 978-0470-05512-0
- Mikel P. Groover: *Fundamentals of Modern Manufacturing, Materials, Processes and Systems*, Third Edition, United States of Amerika, p. 520, ISBN 978-0-471-74485-6
- James G. Bralla: *Handbook of Manufacturing Processes*, First Edition, Industrial Press Inc., New York, 2007, ISBN 0-831 1-3179-9
- Helmi A. Youssef, Hassan El – Hofy: *Machining Technology, Machine tools and operations*, CRC Press, United States of Amerika, p. 672, ISBN 978-1-4200-4339-6

Schedule

1st week Registration week

2nd week:

Lecture: Integral body and frame, drivetrain layouts, crumpling zones, energy absorbing solutions.

Practice: Suspension systems and springs: independent and depended suspension.

4th week:

Lecture: Brake systems. Drum and disc brakes, master cylinders, brake boosters.

Practice: Assembling and adjusting steering gears, and suspensions

6th week:

Lecture: Internal combustion engines (ICE). Major engine components. A four-stroke and a two-stroke power cycle. Gasoline and diesel engines.

Practice: Lubrication and fuel systems. Supercharging and turbochargers, emissions control devices.

8th week: 1st drawing week**9th week:**

Lecture: The place and ponderosity of assembly in the manufacturing process. The property of an assembly system.

Practice: Computer aided modelling of the parts of assembly devices I. (Solidworks software)

11th week:

Lecture: Examination of assembly dimension chains (total and particular variation methods)

Practice: Task solutions for assembly dimension chains

13th week:

Lecture: Assembly of machine elements I.

Practice: Computer aided planning of assembly tasks II. (Solidworks software)

15th week: 2nd drawing week**3rd week:**

Lecture: Steering system: steering linkage, tie rods, control arms, ball joints, power steering system.

Practice: Rack-and-pinion steering, recirculating-ball steering, electronic power steering systems

5th week:

Lecture: Parking brake systems. Bleeding brakes. Anti-lock brake systems, brake assist.

Practice: Tire construction, tire codes. Balancing wheels. Aligning wheels: caster, camber, toe-in, toe-out, turning radius.

7th week:

Lecture: The Cooling system of ICE: a radiator, a fan, a water pump, a thermostat, and their operation.

Practice: Electrical system and main parts of it. Starter, alternator, ignition system.

10th week:

Lecture: Manufacturing devices for assembly. The main types of assembly devices. The types of position determination.

Practice: Computer aided modelling of the parts of assembly devices II. (Solidworks software)

12th week:

Lecture: Assembly operations. Typical assembly systems. Assembly tree.

Practice: Computer aided planning of assembly tasks I. (Solidworks software)

14th week:

Lecture: Assembly of machine elements II.

Practice: Computer aided planning of assembly tasks III. (Solidworks software)

Requirements**A, for a the practice mark:**

- Students have to visit the lectures and seminars. Three misses are permissive for the seminar.
- They have to solve an own technological designing task.
- Students have to write two tests from the two parts of the lecture. They have to write them for minimum sufficient marks. Based on these result they will get the final practice mark.