Hochschule Kempten
University of Applied Sciences

Mechanical Engineering Faculty

English-taught Study Modules in Winter Semester 2018/19

Course Descriptions

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Module Description	**Introduction into Computational Fluid Dynamics**
Module number	
Abbreviation	
possibly sub-module	
Person responsible	Prof. Dr. Erick Johnson
Lecturer	Prof. Dr. Erick Johnson
Faculty	Mechanical Engineering
Level	Bachelor
Semester	6,7
Instructive form	Lecture
Lecture hours per week	4
ECTS-points	5
Workload presence	60
Workload self-study	65
Language	Lecture notes and exam: English Language of instruction: English
Recommended requirements	Basic knowledge of fluid dynamics and engineering mathematics
Module objectives/ learning results *(knowledge, skills, competence)*	Ability to perform a wide range of CFD analyses in ANSYS Workbench and develop a basic understanding of the computational methods and mathematics underlying these solutions.
Contents	Learn the concepts and theories of the finite difference and finite volume methods and their implications for CFD solutions. Build upon theoretical knowledge to develop practical experience in commercial CFD packages, to include: meshing, steady and unsteady systems, with moving bodies, inviscid, laminar, and turbulent flows, energy and compressibility, single, dispersed, and multiphase fluids. Be successful in applying engineering judgment and CFD theory to interpret and critique mesh, solution methods, and results.
Examination regulations	examination study work
Examination contents (detailed)	Simulation and analysis of a complex fluid dynamics problem. Handing in a written composition discussing model and simulation results.
Media forms	Projector, overhead projector, white board and accompanying lecture notes, PC, ANSYS
Literature *(detailed)*	Software Tutorials Lecture Notes Griebel, M.; Dornseifer, T.; Neunhoeffer, T.: Numerische Simulation in der Strömungslehre Griebel, M.; Dornseifer, T.; Neunhoeffer, T.: Numerical Simulation in Fluid Dynamics A Practical Introduction Anderson, J.D.: Computational Fluid Dynamics

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Module Description	Machine Vision Project
Module number	MB26-E
Abbreviation	PrArb
possibly sub-module	
Person responsible	Prof. Dr. Michael Layh, Prof. Dr. Bernd Pinzer
Lecturer	Prof. Dr. Michael Layh, Prof. Dr. Bernd Pinzer
Faculty	mechanical engineering
Level	Bachelor
Semester	6, 7
Instructive form	Lecture
Lecture hours per week	2
ECTS-points	5
Workload presence	30
Workload self-study	95
Language	Lecture notes and exam: English Language of instruction: English
Recommended requirements	Some basic knowledge in computer programming (e.g. control structures, loops, arrays, …) and the basics of optics would be advantageous. However, possible gaps in the students' knowledge will be addressed within the introduction to this course.
Module objectives/ learning results *(knowledge, skills, competence)*	In the production environment, optical measurement systems and cameras for 2D and 3D imaging are ubitquitous: machine parts are being measured in an automated manner, products are being checked for defects, and robots and vehicles are learning to "see". Within this course students will develop a deep insight into various state-of-the art Machine Vision techniques. Next to the theoretical fundamentals they will experience the practical application within extended lab work.
Contents (Note*: line feed with Alt+Return)*	In the first weeks of the semester the contents of (1) are conveyed. Then groups of four to six students are formed and projects are assigned (2), followed by independent teamwork with the contents (3) and (4). There is support during the involved lab work and due to group meetings on a regular basis. The presentations of results (5) will be held in plenary. 1. Introduction into Machine Vision including some basics in optics and imaging processing (class work) 2. Student project assignment (class work) 3. Literature study and familiarization with the involved lab work and equipment (self-study) 4. Performing the assigned Machine Vision task including extended lab-work. Interpretation and documentation of the results (self-study) 5. Finale presentation (plenary)
Examination regulations	Student research project
Examination contents (detailed)	Presentation and documentation of the assigend Machine Vision project.
Media forms	Lecture, team meetings, lab-work, self-study
Literature *(detailed)*	"Machine Vision: Automated Visual Inspection: Theory, Practice and Applications" by Juergen Beyerer and Fernando Puente León, Springer 2016

Module Description	Factory Simulation Project
Module number	WI44-E
Abbreviation	FabSim
possibly sub-module	
Person responsible	Prof. Dr.-Ing. G. Winz
Lecturer	Prof. Dr.-Ing. G. Winz, M. Schlump
Faculty	mechanical engineering
Level	Bachelor
Semester	6, 7
Instructive form	Lecture
Lecture hours per week	2
Credit Points (CP)	5
Workload presence	30
Workload self-study	95
Language	Lecture notes and exam: English Language of instruction: German or English
Recommended requirements	Basic knowledge of Shopfloor Management
Module objectives/ learning results *(knowledge, skills, competence)*	The student knows the relationship between cycle time, work in progress and capacity utilisation in the production. They understand the queueing theory and its application in the shopfloor production. The student gets to know the simulation software plant simulation of tecnomatix. With this knowledge the students are able to determine the performance of a machine / a conveyor / a production system / a fabrication through simulation, to interprete the simulation results and conclude the right measurements for production control and planning (capacity sizing and reduction of variability). The students are able to transform simple assignments from practice into an abstract simulation model and derive from the simulation results concepts for the practice. Furthermore the students train their ability to present complex and abstract facts to a professional audience.
Contents (Note*: line feed with Alt+Return)*	In the first weeks of the semester the contents of (1) and (2) are conveyed. Then groups of four to six students are formed, followed by independent teamwork with the contents (3) and (4). There is support on the learning platform Moodle and regulary consultations. The presentations of results (5) will be held in plenary. 1. Fundamentals of lean material flow: The workshop production as queuing network; the logistic laws. 2. Introduction to the simulation technology and the software Tecnomatix: Building and evaluation of models for the simulation of material flow, programming of simple routines. 3. Independent deepen the knowledge by using the online platform Moodle (models, videos, descriptions, tutorial etc.) 4. Building a simulation model in teamwork, performing simulations and interpretation of results 5. Documentation and Presentation
Examination regulations	Student research project
Examination contents (detailed)	Presentation of the elaborated simulation model (50 %). Furthermore, the documentation of the model and the simulation results (50%).
Media forms	Beamer, PC with simulation software, moodel
Literature *(detailed)*	- Online Tutorial - G. Winz: Logistische Gesetzmäßigkeiten im schlanken Materialfluss, Logos Verlag, Berlin 2012 - Wallace J. Hopp und Mark L. Spearman: Factory Physics; Verlag Mcgraw-Hill Publ.Comp. 2008