Course Description – summer 2024

Title	Numerical Heat Transfer Simulation
Faculty	Mechanical Engineering
Professor	Prof. Dr. Robert Pietzsch
ECTS	5
Level	Bachelor
Requirements	-
Add. Information	https://www.hs-schmalkalden.de/hochschule/fakultaeten/fakultaet-maschinenbau/internationales/englische-kurse.html
Content	1. In competition of this subject, the students should be able to calculate independently temperature fields in simple technical structures. They should know the terms and physical quantities of the theory of heat transfer and they should be able to apply them. 2. The thermal calculation environment of the ANSYS program should be mastered safely. One important competence is to select the right finite element type for a given application and to understand the different properties and degrees shape functions. During the examination (120min) the students should demonstrate their skills to solve two heat transfer problems using ANSYS. 1. laws and terms of heat transfer, balance equation of internal energy 2. manual calculation of temperature fields and simple heat transfer problems 3. fundamentals of the Finite Elements Method, elements formulation, shape functions, time integration methods, Introduction in ANSYS environment 4. simple cooling behaviour of a compact body 5. steady heat conduction in a linear rod 6. transient heat conduction in a cooled slab 7. thermal contact of two linear slabs at the face side (contact temperature) 8. transient heat exchange and temperature equalization in a plane structure 9. steady heat conduction and heat transfer capacity of a flat fin 10. thermomechanical coupling of structural and thermal calculation- thermal strains and stresses, thermal distortion 11. axissymmetric problems, solved in a cross section 12. heat conduction in volumetric bodies 13. radiation heat transfer as boundary condition 14. time-dependent thermal boundary conditions