

<b>Module number</b>	<b>Module name</b>	<b>Module coordinator</b>
BIW-MA-AC-E-08	Multiscale Mechanics	Prof. Dr. Stefan Löhnert imf@mailbox.tu-dresden.de
<b>Learning goals</b>	The students have an overview of the main goals, work and application areas of multiscale modeling of composite materials. They know the essential mechanical principles, approaches and methods for the homogenization of heterogeneous materials and can determine effective elastic parameters of these materials.	
<b>Content</b>	Contents of the module are topics on multiscale modeling of composite materials and materials with microcavities and microcracks, with special focus on the analytical determination of effective elastic parameters. In particular, the course includes the concept of representative volume elements, scale transitions by homogenization and localization, homogeneous boundary conditions, averaging methods, effective material properties, the self-consistent method, solutions based on Eshelby's results, Voigt and Reuss approximations, and micromechanical model parameters such as the microcrack density.	
<b>Teaching and learning methods</b>	2 hours of lectures, 1 hour of exercise per week, and self-study	
<b>Prerequisites</b>	Knowledge from the module Continuum Mechanics and Tensor Calculus as well as basics of fracture mechanics from the module Building Materials in the first semester are required.	
<b>Applicability</b>	The elective module is one out of twelve in the Master's program Advanced Computational and Civil Engineering Structural Studies, of which five have to be chosen.	
<b>Requirements for earning credit points</b>	The credit points are awarded if the module examination is successfully passed. The module examination consists of a written exam of 90 minutes and an ungraded portfolio of 40 hours. The examination language is English.	
<b>Credit points and grades</b>	Five credit points can be acquired for this module. The module grade results from the weighted average of the grades of the written exam and the portfolio, taking into account § 15 paragraph 1 clauses 5 and 6 of the examination regulations. The written exam is weighted twice and the portfolio is weighted once.	
<b>Module frequency</b>	The module is offered every academic year in summer semester.	
<b>Workload</b>	The total workload is 150 hours.	
<b>Module duration</b>	The module lasts one semester.	