Module name	**Medical Automation Engineering and Measurement**
Module number	EuI-BMT-C-MAM
Lecturer in charge	Prof. Dr.-Ing. habil. Hagen Malberg lehre.ibmt@tu-dresden.de
Objectives	After completing the module, students will understand basic forms of behavioral description for medical technology systems and will have mastered the elementary theoretical and computer-aided handling of linear, time-invariant and discrete-event behavioral models for controlling medical technology systems. They are able to independently design regulation and control algorithms for simple tasks. Students are familiar with the principles of analog measurement methods and can transfer them to biomedical systems. They can evaluate measurement results using statistical methods and calculate and interpret random and systematic measurement uncertainties. Students have extensive skills and experience in setting up and carrying out experiments, using electronic measuring devices, evaluating and presenting experimental and measurement results, assessing measurement methods and measurement uncertainties and keeping records.
Contents	The contents of the module are the basics of automation technology with a focus on behavioral description, controller design in the frequency range, digital control loops, standard medical controllers, discrete-event controllers, elementary control concepts and automation technologies as well as the basics of measurement with a focus on medical measurement principles, SI and medically relevant units, analog measurement technology, in particular basics, measurement bridges, lock-in measurement technology, quadrature demodulation technology, measurement of transit times and distances in biomedical engineering, and statistical measurement data evaluation, in particular calculation of standard deviations and confidence intervals, propagation of measurement uncertainty, preparation of the measurement uncertainty budget.
Modes of teaching and learning	2 hours per week lectures, 1 hour per week exercises, 1 hour per week practical lab courses and self-study.
Prerequisites	The skills to be acquired in the modules **Physico-chemical Fundamentals of Biomedical Engineering** and **Basics of Electrical Engineering** are required.
Usability	The module is a compulsory module in the basic studies of the degree programme Biomedical Engineering. It creates the prerequisites for the modules that list that module in the "Prerequisites" field.
Requirements for the award of credit points	The credit points are awarded when the module assessment is passed. The module assessment consists of a portfolio of 80 hours.

Credit points and grades	6 credit points can be obtained by the module. The module grade is the grade of the examination.
Frequency	The module is offered every summer semester.
Workload	The total effort is 180 hours.
Duration	The module takes one semester.