Module name	**Computational Life Science Teamproject**
Module number	CMS-TRK-TEA-CLS
Senior Lecturer	Prof. Dr. Ivo Sbalzarini ivo.sbalzarini@tu-dresden.de
Qualification objectives	Students are able to work on a complex research-related project. Students are able to solve a larger, typically interdisciplinary, challenge from computational life science within a group of 2-4 people. They are proficient in literature research and the use of scientific information sources, and have in-depth expertise as well as extensive methodological and interpersonal skills in project management and teamwork.
Contents	The module will cover multidisciplinary editing, application and communication of a content focus at the student's choice in areas such as bioinformatics, computational biology, biological or medical AI, scientific computing for life sciences, biomedical computer vision and visualisation, or mathematical modelling of living systems.
Forms of teaching and learning	The module includes 8 SWS projects and self-study. The language of the projects will be English.
Eligibility for participation	Independent programming skills in any computer language are required, as well as skills in algorithms and data structures, analysis of univariate and multivariate functions, linear algebra, probability calculation and bachelor-level statistics.
Usability	The module is a compulsory module in the Computational Modeling and Simulation Masters Course in Track Computational Life Science. The module provides the pre-requisites for the modules it designates under the pre-requisites for participation.
Conditions for the award of credits	Credits are awarded when the module test is passed. The module test consists of a complex performance of 80 hours. The language of the test will be English.
Credits and marks	The module allows for the award of 10 credit points. The module score corresponds to the test performance score.
Frequency of the module	The module is offered every semester.
Workload	The total workload is 300 hours.
Duration of the module	The module covers 1 semester.
Module name	**Advanced Biological Physics**
Module number	CMS-TRK-ABP
Senior Lecturer	Prof. Dr. Benjamin Friedrich

	benjamin.m.friedrich@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of theoretical biological physics and are familiar with important model ideas, methods of mathematical modelling of biological systems and concepts of continuum mechanics. Students think cross-curricularly and can use the theoretical knowledge they have acquired to independently develop mathematical models to describe biological processes.
Contents	The content of the module is polymerisation dynamics of biopolymers, force generation by molecular motors, cell and tissue mechanics, and concepts of continuum mechanics and their application to describe biological systems.
Forms of teaching and learning	The module includes lectures of 2 SWS, exercises of 2 SWS and self-study. The language of the lectures and exercises will be English.
Eligibility for participation	Mathematical knowledge such as integral and differential accounting, ordinary and partial differential equations, basic knowledge of statistical physics and basic knowledge of basic polymer models at bachelor's level are required. The following literature is suitable for preparation: 1. Biological Physics. Philip Nelson. Chiliagon Science, 2020, 2. Mechanics of Motor Proteins and the Cytoskeleton. Jonathon Howard. Sinauer Associates is an imprint of Oxford University Press, 2001, 3. Soft Condensed Matter Physics in Molecular and Cell Biology. W.C.K. Poon, David Andelman. CRC Press, 2019, 4. Principles of Condensed Matter Physics. Chaikin, P.M., Lubensky, T.C. Cambridge Univerity Press, 1995; 5. Hydrodynamics.L.D. Landau, E.M. Lifshitz. Pergamon Press, Oxford. 6. Low-Reynolds Number Hydrodynamics. John Happel, Howard Brenner, Springer, 2009, 7. Non-Equilibrium Thermodynamics. S.R. de Groot, P. Mazur. Dover Publications Inc, 1984.

Usability	In the Computational Modeling and Simulation Masters Course, the module is an optional module in the Track Computational Life Science and in the Track Computational Mathematics, to be selected in accordance with Annex 2 to the Specific Examination Regulations. The module cannot be chosen in the Master's Course Computational Modeling and Simulation if this or a module with substantially the same content from a Course with which the entry conditions under § 3 of the Studienordnung have been met has already been completed. The module provides the pre-requisites for the modules it designates under the pre-requisites for participation.
Conditions for the award of credits	Credits are awarded when the module test is passed. The module test consists of a non-public oral test performance as an individual test lasting 30 minutes. The language of the test will be English.
Credits and marks	The module allows 5 credit points to be obtained. The module score corresponds to the test performance score.
Frequency of the module	The module is offered every summer semester.
Workload	The total workload is 150 hours.
Duration of the module	The module covers 1 semester.