Application Form for the International Master's Program „Computational Modeling and Simulation" (CMS) at TU Dresden

(according to the CMS aptitude assessment regulations)

Please note:
Evidence of all qualifications must be attached to the application in original or as certified copy with translations in German or English where applicable. You must <u>add</u> related official certificates, transcript of records, bachelor degree certificate, etc. Incomplete applications will not be considered.

Personal data:

Family/Last name: _____

Given/First name: _____

Date and place of birth: _____

Citizenship(s): _____

E-mail address: _____

Current postal address: _____

_____

_____

I apply for the following CMS Track:
(You can apply for **<u>one</u>** track, only!)

□ **Computational Life Science**
(Computational Biology; Computational Psychology and Neuroscience; Systems Biology; Biomedical Image Analysis and Visualization; Simulations of Biological and Medical Systems; Biomedical Data Science; Personalized Medicine; Bioinformatics; Molecular Modeling; Machine Learning in Life Sciences)

□ **Computational Mathematics**
(Numerical Mathematics; Numerical Methods for PDEs; Scientific Computing; Algorithms for High Performance Computing; Simulations in Materials Science; Simulations in Biology and Biophysics; Computational Architecture and Design)

□ **Visual Computing**
(Computer Vision; Computer Graphics; Interaction Design; Machine Learning; Special Effects in Movies; Virtual and Augmented Reality; Autonomous Driving; Immersive Visual Analytics; Visual Data Understanding; Human in the Loop)

□ **Computational Engineering**
(Computational Fluid Dynamics (CFD); Multi-Body Dynamics (MBD); Finite Element Method (FEM) Structural and Electromagnetical; Simulations of Engineering Systems; Computational Mechanical and Electrical Engineering; Virtual Prototypes; Digital Twins)

□ **Computational Modelling in Energy Economics** *(partially in German, see (3) below)*
(Data Science in Energy Economics; Energy Market Analysis and Simulation; Software for Power Utilities; Modelling in Energy Management; Smart Grid; Energy and Environmental Policy Prediction; Interaction between Markets and Environment; Computational Optimization of Energy Systems)

□ **Logical Modelling**
(Artificial Intelligence; Knowledge Models; Intelligent Agents; Knowledge Graphs; Formal System Analysis and Design; Problem Solving and Optimization Algorithms; Computational Logic; Inference Systems; Expert Systems; Theoretical Aspects of Learning and Modeling; Discrete Algorithms)

(1) Degree
a) I obtained / b) I will obtain my first university degree qualifying for professional activity in *Computer Science, Mathematics, Natural Sciences, Economics or Engineering*

Title of the degree: _____

a) Date of the degree: _____

b) Date of the expected graduation: _____
I have achieved _____ % of the credits needed for the completion of the degree program.
(attach original confirmation from your university)

University Name and Country: _____

(2) English language proficiency (acc. to aptitude assessment regulations, § 4 (2))
(Knowledge of English corresponding to at least level B2 of the European Frame of Reference for Languages is required)

□ Native speaker; home country: _____

□ Previous degree studies in English: _____ % or _____ ECTS credits

□ scientific work in English
written by myself: _____(has been attached)

□ English language test (title, result): _____

□ Education before university (specify): _____
(e. g. English lessons for six years as part of the German "Abitur")

(3) German language proficiency (not required)
(Knowledge of the German language is not required for CMS studies. However, certain optional lectures may be offered in German, leading to larger selection possibilities. In addition, the track "Computational Modeling in Energy Economics" can only be selected if German proficiency is given. For all other tracks, this is not required, and it does not constitute an admission criterion.)

□ I feel able to follow classes that are completely taught in German.

□ I feel able to follow classes in German if slides and supporting materials are in English.

□ I do not feel able to follow classes taught in German.

(4) Relevant knowledge

(A prerequisite for studying CMS is independent working knowledge of computer programming in at least one compiled language, as well as mathematical and scientific basics. Please tick the boxes below to assess your skills.)

□ I can independently implement, debug and run computer programs in (tick all that apply):

- □ C++
- □ C
- □ Fortran (any version)
- □ Java
- □ Python
- □ Matlab / Octave
- □ Other; please specify: _____

□ I have seen or used the following languages, but am not really independent in them:

_____

_____

□ I have working knowledge of parallel programming using:
(additional qualification, not required for admission)

- □ message passing (MPI, 0mq, sockets, etc.)
- □ multi-threading (OpenMP, pthreads, Java Threads, etc.)
- □ GPGPU programming (CUDA, OpenACC, OpenCL, etc.)

□ I have working knowledge of the following at least on the level of a bachelor in engineering/science course:

- □ Calculus of functions in one and multiple variables (partial derivatives, etc.)
- □ Basics of linear algebra (matrix and vector operations, inversion, decompositions)
- □ Basics of probability (distributions, elementary probabilities, axioms)
- □ Basics of discrete mathematics (logic, set theory, algebraic structures)
- □ Basics of physics (classical mechanics, electromagnetism, optics, thermodynamics)
- □ Basics of biology (components of a cell, theory of evolution, ecosystems)
- □ Basics of chemistry (atoms, periodic table, organic molecules (proteins, DNA, …))
- □ Basics of numerics (linear algebra, solving ODE/DAE, field methods for PDEs)

□ I have completed my B.Sc. thesis (or previous M.Sc. thesis) about:

- □ Title:_____
- □ Thesis work duration in work hours: _____ hours

Optional: *A copy of the thesis (or its abstract if the thesis is not completed yet) may be attached in PDF format if you wish to do so, or a download link provided here:*

_____

(5) Courses previously completed as additional qualification
(Please attach the corresponding module or course descriptions with your application, and do not forget to fill in the number of teaching hours or ECTS-credits in the table below)

I received the following study results and attached the corresponding certificates:

Related course titles and description (fill in actual title of the course you took in the indicated topic areas)	**Teaching hours or credits**	**Grade**
Parallel Programming / High-Performance Computing _____		
Numerical Methods / Numerical Algorithms / Numerical Analysis _____		
Stochastics / Probability / Stochastic Algorithms _____		
Data Visualization / Information Visualization / Scientific Visualization _____		
Statistics / Experimental Design / Statistical Inference Methods _____		
Machine Learning / Data Mining / Computational Statistics _____		
Theoretical Computer Science / Formal Languages / Complexity and Computability _____		
Logical deduction / Intelligent Agents / Knowledge Systems _____		
Sofware Engineering / Design Patterns / Scientific Code Design _____		
Database Management / Relational Data Models / Big Data Platforms _____		

(6) Courses previously completed in the area of the selected track
(§ 5 (1) aptitude assessment regulations requires "Bachelor-level knowledge in the application area of the selected track)

Towards this requirement, I have passed the following courses (please attach the module/course descriptions of these courses with your application documents):

Course or module title	**Teaching hours or credits**	**Grade**
_____		
_____		
_____		
_____		
_____		
_____		
_____		
_____		

(7) ***Read and tick both boxes to confirm:***

- I confirm that all statements have been made conscientiously and truthfully. All supporting certificates and documents (also optional ones if I wish) have been attached.

- I confirm that I have read and understood the Core Values and Guiding Principles of the CMS program and I vouch for adhering to them (https://tu-dresden.de/inf/ma-cms/core-values)

Place, date: **Signature:**