

**Modules:** ECThPhysics **Elective Courses Theoretical Physics**  
 physics70c **Elective Advanced Lectures: Theoretical Physics**

**Course:**  **Computational Physics (T)**

**Course No.:** physics760

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises and project work	English	2+2+1	7	WT/ST

**Requirements for Participation:**

Knowledge of a modern programming language (like C, C++)

**Preparation:**

Theoretical courses at the Bachelor degree level

**Form of Testing and Examination:**

successful participation in exercises,  
 presentation of an independently completed project

**Length of Course:**

1 semester

**Aims of the Course:**

ability to apply modern computational methods for solving physics problems

**Contents of the Course:**

Statistical Models, Likelihood, Bayesian and Bootstrap Methods  
 Random Variable Generation  
 Stochastic Processes  
 Monte-Carlo methods  
 Markov-Chain Monte-Carlo

**Recommended Literature:**

W.H. Press et al.: Numerical Recipes in C (Cambridge University Press)  
<http://library.lanl.gov/numerical/index.html>  
 C.P. Robert and G. Casella: Monte Carlo Statistical Methods (Springer 2004)  
 Tao Pang: An Introduction to Computational Physics (Cambridge University Press)  
 Vesely, Franz J.: Computational Physics: An Introduction (Springer)  
 Binder, Kurt and Heermann, Dieter W.: Monte Carlo Simulation in Statistical Physics (Springer)  
 Fehske, H.; Schneider, R.; Weisse, A.: Computational Many-Particle Physics (Springer)