# Module: Elective Advanced Lectures: Theoretical Physics

**Module No.:** physics70c

# Course: High performance computing: Modern computer architectures and applications in the physical science (T)

**Course No.:** physics7505

| Category | Type | Language | Teaching hours | CP | Semester |
|---|---|---|---|---|---|
| Elective | Lecture | English | 2 | 3 | WT/ST |

**Requirements for Participation:**
Knowledge of a modern programming language like C/C++

**Preparation:**

**Form of Testing and Examination:**
oral examination

**Length of Course:**
1 semester

**Aims of the Course:**
Understanding principles of modern computer architectures and their usage and programming for scientific problems

**Contents of the Course:**
Computer architectures and system components (CPU, memory, network)
Software environment
Parallel architectures and parallel programming paradigms (MPI, OpenMP/threads)
High Performance Computing

**Recommended Literature:**
John L. Hennessy, David A. Patterson: Computer Architecture - A Quantitative Approach. Morgan Kaufmann Publishers, 2012
David A. Patterson, John L. Hennessy: Computer Organization and Design - The Hardware / Software Interface. Morgan Kaufmann Publishers, 2013
W.H. Press et al.: Numerical Recipes in C (Cambridge University Press)
Message Passing Interface Forum: MPI: A Message-Passing Interface Standard, Version 3.1
OpenMP Application Programming Interface, Version 4.5, November 2015