

**Module: Base Module Theoretical Physics**

Module No.: physics605

**Course:**  **Advanced Theoretical Physics**

Course No.: physics607

| Category | Type                   | Language | Teaching hours | CP | Semester |
|----------|------------------------|----------|----------------|----|----------|
| Elective | Lecture with exercises | English  | 3+2            | 7  | WT       |

**Requirements:****Preparation:**

3-year theoretical physics course with extended interest in theoretical physics and mathematics

**Form of Testing and Examination:**

Requirements for the module examination (written examination): successful work with exercises

**Length of Course:**

1 semester

**Aims of the Course:**

Introduction to modern methods and developments in Theoretical Physics in regard to current research

**Contents of the Course:**

Selected Topics in Modern Theoretical Physics for example:

Anomalies

Solitons and Instantons

Quantum Fluids

Bosonization

Renormalization Group

Bethe Ansatz

Elementary Supersymmetry

Gauge Theories and Differential Forms

Applications of Group Theory

**Recommended Literature:**

M. Nakahara; Geometry, Topology and Physics (Institute of Physics Publishing, London 2nd Ed. 2003)

R. Rajaraman; Solitons and Instantons, An Introduction to Solitons and Instantons in Quantum Field Theory (North Holland Personal Library, Amsterdam 3rd reprint 2003)

A. M. Tsvelik; Quantum Field Theory in Condensed Matter Physics (Cambridge University Press 2nd Ed. 2003)

A. Zee; Quantum Field Theory in a Nutshell (Princeton University Press 2003)