

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

**Course:**  **Quantum Field Theory (T)**

**Course No.:** physics755

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

**Requirements for Participation:**

**Preparation:**

Advanced quantum theory (physics606)

**Form of Testing and Examination:**

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

**Length of Course:**

1 semester

**Aims of the Course:**

Understanding quantum field theoretical methods, ability to compute processes in quantum electrodynamics (QED) and many particle systems

**Contents of the Course:**

Classical field theory  
 Quantization of free fields  
 Path integral formalism  
 Perturbation theory  
 Methods of regularization: Pauli-Villars, dimensional  
 Renormalizability  
 Computation of Feynman diagrams  
 Transition amplitudes in QED  
 Applications in many particle systems

**Recommended Literature:**

N. N. Bogoliubov, D.V. Shirkov; Introduction to the theory of quantized fields (J. Wiley & Sons 1959)  
 M. Kaku, Quantum Field Theory (Oxford University Press 1993)  
 M. E. Peskin, D.V. Schroeder; An Introduction to Quantum Field Theory (Harper Collins Publ. 1995)  
 L. H. Ryder; Quantum Field Theory (Cambridge University Press 1996)  
 S. Weinberg; The Quantum Theory of Fields (Cambridge University Press 1995)