Program	Level of studies		Second cycle	
	Program name		**Physics**	
Course name	**QUANTUM FIELD THEORY III**			
Course ID	Semester	Course status	ECTS credits	L+E
PTH9631	**II**	**ELECTIVE**	**6**	**3+2**
Lecturer	**Prof. dr. Dejan Milošević**			
Aims and intended learning outcomes	The aim of the course is to deepen students' knowledge of quantum field theory at a higher level than in the introductory course. The formalism of quantum field theory is applied to various areas of contemporary quantum theory. The learning outcome is mastering the formalism of quantum field theory and applications in various areas of modern physics.			

Course content

Lorentz and Poincaré symmetries in quantum field theory. Classical field theory. Theorem Noether. Scalar fields. *U*(1) charge. Spinor fields. Weyl equation. Dirac equation. Chiral symmetry. Majorana mass. Electromagnetic field. Quantization of free fields. Scalar fields. Fields with spin 1/2. CPT symmetries. Electromagnetic field. S-matrix. LSZ reduction formula. Wick's theorem and Feynman diagrams. Renormalization. Cross sections and decay rates. Quantum electrodynamics. Divergence. Electroweak interaction. Four-fermion model. The charged and neutral currents in the standard model. Path integral method in field theory. Scalar fields. Perturbations. Euclidean formulation of the path integral method. Critical phenomena. Quantum field theory at the finite temperature. Instantones. Non-abelian gauge theories. Yang-Mills theory. Quantum chromodynamics. Spontaneous symmetry breaking.

Student workload (hours)		Grading	
Lectures and Exercises	75	Assessment method	Points
Exam preparation	75	Partial exam	50
Assignments		Final exam	50
Other			
Total	150		
		Total	100

Literature

Mandatory:

1. D. Milošević, Relativistička kvantna mehanika, Univerzitetski udžbenik, bosnia ARS, Tuzla, 2005.
2. Lecture notes.

Recommended:

1. M. Maggiore, A modern introduction to quantum field theory, Oxford Master Series in Statistical, Computational, and Theoretical Physics, Oxford University Press, New York, 2005.
2. W. Greiner, J. Reinhardt, Field quantization, Springer, Berlin, 1996.

Remarks