

**SEMINARS:**

The topic №	Name of topics for class	Number of hours	Maximum score
1	Operators and inverse operators, the uncertainty principle and the principle of superposition, matrices.	1	5
2	Energy and momentum, transformation matrices, matrix density.	1	5
3	Motion in a centrally symmetric field. Spherical coordinates, decomposition in plane waves.	1	5
4	Gauss's Law for Electric Fields. Gauss's Law for Magnetism.	1	
5	Fields in a Medium.	1	5
6	Phase Transitions, Spontaneous Symmetry Breaking.	1	5
7	Reflection and Refraction.	1	5
8	Harmonic Oscillator. Ladder Operators.	1	5
9	Natural Units and the Metric Used in Particle Physics.	1	5
10	The explosions of supernovae, quasars, pulsars, neutron stars.	1	5
11	Real and Virtual Particles in Feynman Diagrams	1	5
12	Electron Self-energy. Vacuum Polarization.	1	5
13	Electroweak Phase Transition. Diagram techniques.	1	5
14	Neutrino Oscillations and Masses.	1	5
15	Inflation, Supersymmetry, Superstrings.	1	5