

Modern Physics GEFIT005M-a
Curriculum and Requirements
2019/2020. I. semester

Curriculum:

- 37. week An overview of classical physics.
- 38. week The special theory of relativity. The Lorentz-transformation. Basic concepts of relativistic dynamics. Mass energy equivalence.
- 39. week Experimental basis of quantum physics, Blackbody radiation, the molar heat capacity of solids at low temperature. Photoelectric effect.
- 40. week Bohr's postulates, de-Broglie hypothesis. Lab demonstration. Wave particle duality of particles, de-Broglie hypothesis.
- 41. week Test 1. Mathematical basis of quantum physics: wave functions and operators.
- 42. week The Schrödinger equation. The Heisenberg uncertainty principle
- 43. week Free particle. Infinite 1D potential well. Step potential and quantum tunnelling.
- 44. week Quantum statistics. Structure of atoms and molecules.
- 45. week Nuclear physics. Radioactivity α -, β -, γ -radiation. The laws of radioactive decay. Mass defect and nuclear binding energy. Nuclear fission. The nuclear reactor. Nuclear fusion.
- 46. week Test 2. Fundamentals of solid state physics.
- 47. week: Band theory of solids.
- 48. week Semiconductors, diodes. Transistors.
- 49. week Superconductivity. Graphene and silicene.
- 50. week Test 3

The requirements for signature and final examination:

- 1. Students have to attend at least half of the lessons.
- 2. Students have to pass on the tests.

If somebody does not obtain signature at the end of semester, because does not fulfil the first condition above, but the Dean of Faculty gives him or her the permission to get it, the student has to report from the whole subject at the lecturer.

If somebody does not get signature at the end of semester, because does not fulfil the second condition above, he or she can write a getting signature test, during the examination period, until a given date decided by the Dean of Faculty.

The students write three tests during the semester. Each test contains one topic from the full material of the appropriate part of the semester and multiple choice tests. The total score of the three tests is 100, and minimum 20 scores are necessary for the signature and 50 for the successful exam.

In case of low number of obtained points, the tests can be repeated at the exam session. If the student asks, he or she can take an oral exam to obtain additional points and a better grade.

Books, recommended literature:

- 1. Halliday, Resnick, Walker: Fundamentals of Physics, John Wiley 1981., 2008., 2011.
- 2. Alonso and Finn: Fundamental University Physics I, II, Addison-Wesley Pub., 1980.
- 3. N. DasGupta-A. DasGupta: Semiconductor Devices, Modelling and Technology, PHI Learning, 2011.

Miskolc, 07. 09. 2019.

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