

Program MidtermExam  
on the discipline «**Modern computational methods in nuclear physics contents**» for  
undergraduates 1 courses of specialty «6D060500 – Nuclear physics »

The proposed MidtermExam program on discipline «**Modern computational methods in nuclear physics contents**» is made according to the discipline syllabus. The program determines the requirements for the levels of mastering the academic discipline: what the student should have *an idea* after studying the course for 7 weeks, which should know what *skills* and *habits* should be formed.

At MidtermExam, students will be asked two theoretical questions and one task.

**Midterm addresses the following questions:**

1. Introduction to the course "Programming and computer calculations in physics"
2. Introduction to the system of Mathematica
3. Model of calculating
4. Numbers. Their representation and operations over them
5. Arithmetic: the decomposition of integers into prime factors
6. Arithmetic: primenumbers
7. Division with remainder, deductions, comparisons
8. The Chinese remainder theorem
9. Numerical functions
10. Multimedia: geometry, graphics, cinema, sound
11. Factorization Factor Integer ECM
12. Plotting
13. Linear programming
14. Nuclear Forces
15. Nuclear Models

**BIBLIOGRAPHY**

**Basic:**

1. P.Bodenheimer, G.P.Laughlin, M.Rozyczka, T.Plewa, H.W Yorke, Numerical Methods in Astrophysics: An Introduction, 344 pages, CRC Press, December 13, 2006
2. M.Hjorth-Jensen, M.P.Lombardo, Ubirajara van Kolck, An Advanced Course in Computational Nuclear Physics: Bridging the Scales from Quarks to Neutron Stars, 644 pages, Springer; 1st ed. 2017 edition, June 7, 2017
3. C.H.Holbrow, J.N.Lloyd, J. C. Amato, E.Galvez, M.E.Parks, Modern Introductory Physics, 658 pages, Springer; 2nd ed. 2010 edition, September 23, 2010
4. Y.Azmy, E.Sartori, Nuclear Computational Science: A Century in Review, 470 pages, Springer; 2010 edition, May 14, 2010

**Additional literature:**

1. J.H Hamilton, F.Yang, Modern Atomic and Nuclear Physics, 797 pages, World Scientific Pub Co Inc; Revised edition, March 30, 2010
2. Senior Fellow Continuous Electron Beam Accelerator Facility (Cebaf) Governor's Distinguished Cebaf Professor John Dirk Walecka, Theoretical Nuclear AndSubnuclear Physics, 628 pages, Wspc/Icp; 2 edition, September 30, 2004
3. A.Das, T.Ferbel, Introduction to Nuclear and Particle Physics, 416 pages, World Scientific Pub Co Inc; 2 edition, December 29, 2003