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**FEATURES OF THE STUDYING OF THE DISCIPLINE
“NANOMATERIALS AND NANOTECHNOLOGY”**

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The effectiveness of the further development of nanoscience and nanotechnology depends on the quality of training of MA students in the field of “Materials science”. Due to the continuous updating of knowledge in nanoscience the content of the subject “Nanomaterials and nanotechnology” will change.

Discipline “Nanomaterials and nanotechnologies” refers to the modern disciplines that are developing rapidly and are based on the achievements of materials science. The results realized in nanotechnology by creating new materials, functional devices using atomic, molecular and nanometer level. Experts in the field of modern materials and new technologies need in knowledge of the basics of nanoscience.

This discipline has been included in the master «s plans for the specialties “Heat treatment” and “Metall science” in accordance with International Educational Project TEMPUS MMATENG. At the department of Metal Science and Heat Treatment of Metals (PSTU) MA students study this discipline in 2 (10) semester, volume – 6 credits, 180 hours (1 credit - 30 hours), 72 contact hours (48 h – lectures and 24 h - seminars) and 108 hours of the individual work of students, oral exam.

The purpose of this course is to provide a tool for better understanding of the basics about nanomaterials and their structure, different classes of nanomaterials, relation between nanostructure and specific properties, nanotechnology.

The study of discipline is made in a thematic sequence. The main themes of discipline are:

1. Introduction, classification, structure types of nanomaterials.
2. Basic technologies of obtaining of nanomaterials.
3. Features of physical and mechanical properties of nanomaterials, specificity and definitions.
4. Methods of investigations of structure of nanomaterials.
5. Applications of nanomaterials.

For the success of the course students should know well the following courses: “Physics”, “Chemistry”, “Physics of Solids”, “Material Science”, “Strengthening technologies of materials treatment”, “The methods of structural analysis”, “Mechanical properties of Materials”.

The lecture provides guidance on the organization of independent work and practical exercises. The aim of student is individual work is to consolidate the lecture material and better understanding of individual topics using additional technical literature on the most important sections of discipline. Independent work of students is organized on the website of the University. Students must gain confidence to use the acquired knowledge to solve practical problems. Methods of teaching aimed at the systematic organization of systematic work of the student during the semester.

Mastering of theoretical material discipline involves work with textbooks and teaching materials, use of modern information technologies.

The basic literature, which is used:

1. Цао Гочжун, Ин Ван. Наноструктуры и наноматериалы. Синтез, свойства и применение / Пер. с англ. 2-го издания А.И. Ефимова, С.И. Каргов; науч. ред. русс. изд. В.Б. Зайцев. – М.: Научный мир, 2012. – 520 с.
2. Анищик В.М. Наноматериалы и нанотехнологии/ В.М. Анищик, В.Е Борисенко, А.С. Жданок, Н.К. Толочко, В.М. Федосюк. – Минск : Изд. центр БНАН, 2008. – 375 с.
3. Наноматериалы, нанопокрyтия, нанотехнологии: учеб. пособие / Н.А. Азаренков, В.М. Береснев, А.Д. Погребняк, Л.В. Маликов, П.В. Турбин. – ХНУ им. В.Н. Каразина, 2009, – 209 с.
4. Балоян Б.М. Наноматериалы. Классификация, особенности свойств, применение и технологии получения/ Б.М. Балоян, А.Г. Колмаков, М.И. Алымов, А.М. Кротов. – М.: Угрешская типография, 2007. – 102 с.
5. Alagarasi A. Introduction to nanomaterials [Electronic resource] / A. Agarashi. Introduction to nanomaterials. – P. 76. – Access mode: <https://nccr.iitm.ac.in/2011.pdf>