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SOME ASPECTS OF TEACHING HIGHER MATHEMATICS AT IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE

НЕКОТОРЫЕ АСПЕКТЫ ПРЕПОДАВАНИЯ ВЫСШЕЙ МАТЕМАТИКИ В КИЕВСКОМ ПОЛИТЕХНИЧЕСКОМ ИНСТИТУТЕ ИМЕНИ ИГОРЯ СИКОРСКОГО

Summary. *Reviewed questions are about necessity of tight connection between teaching higher mathematics in technical university and requirements of profession. Main methodical aspects of teaching students of technical specialties higher mathematics are highlighted in context of realization of applied mathematics orientation.*

Key word: *mathematics, applied orientation, teaching methodology.*

Аннотация. *Рассмотрены вопросы о необходимости тесной связи преподавания высшей математики в техническом университете с потребностями профессии. Выделены основные методические аспекты преподавания математики студентам технических специальностей в контексте реализации прикладной направленности математики.*

Ключевые слова: *математика, прикладная направленность, методика преподавания.*

At the present stage of student teaching, one of the main principles of higher education didactics is the professional orientation of subject preparation, including mathematical one. In technical university mathematics is to be the one of the fundamental general disciplines. Mathematics is the main language of engineering research, the base of engineer education and is to help to solve professional tasks in engineer work. This explains the strong association between teaching mathematics and needs of the profession, because qualitative mathematical training of future specialist, that meets the requirements of applied orientation of mathematical education, is the key part of professional training.

Major disciplines in different specialties at instrument engineering department of Igor Sikorsky Kyiv Polytechnic Institute have different mathematical apparatus, use different mathematical methods. There is almost no such technical construction that would not need precise calculations of all

systems, mechanisms, nodes and details that it consists of. Calculations are done with utilizing theoretical and practical knowledge, obtained from a lot of special disciplines with using mathematical methods. Features of modeling tasks in instrumentation are the use of a universal mathematical apparatus in the form of differential equations, matrix transformations and stochastic processes, the spectral analysis of signals is based on the integral transform and Fourier series. In course of special disciplines there are considered modern modeling issues based on the use of modern vector-matrix mathematical apparatus. In the preparation of specialists in the field of computer-integrated medical systems, one of the basic disciplines is biophysics, which is the science of the fundamental laws that underlie the structure, functioning and development of living systems. Along with experimental methods, biophysics actively uses mathematical models to describe processes in living systems of different levels of organization, ranging from biomacromolecules, at the cellular and subcellular level, at the level of organs, organisms, populations and communities, and finally, the biosphere in whole. Mathematical methods are widely used in medical instrumentation. The development of mathematical models and methods contributes to the creation of medical technology.

But the research of experience of mathematical training technical specialties students shows that students of 1st and 2nd courses usually insufficiently informed about importance of math in future profession, poorly motivated to learn the subject and special disciplines teachers often notice the lack of required mathematical base. That means that there is no continuity between the fundamental mathematics course and major disciplines and there is lack of compliance of professional orientation in math teaching.

Taking into account general requirements to the methodology of organization and implementation of mathematical training of technical specialties students, we highlight the main methodological aspects of mathematics teaching

in technical university in the context of realization of math teaching applied orientation:

1.   Lecture course presentation has to be given from the point of modern applied mathematics, demonstrating general ways of using math in future profession and suppling them with enough amount practical examples. These examples should be professional and to be understandable for students. In the process of representing of theoretical material exactly physical and mechanical applications of learned ideas should be highlighted (derivative, integral).

2.   During practical lessons it is needed to apply the complex of specially developed and selected professionally oriented tasks. Tasks of such type are the basics of implementation of math teaching applied orientation.

3.   The independent work of students of technical universities has to be organized with using professionally oriented didactical materials and, if possible, with using of electronic manuals that include theoretical, practical, testing and control material, guidelines for solving of professionally applied tasks. Such approach to organization of independent work of students not only contributes to the increase of students' mathematical knowledge quality, but also forms their skills to use obtained knowledge in the process of further education and in further professional activity. Such work has to be implemented in close cooperation of mathematics teacher and teachers of special disciplines.

The efficient activity of the specialist in modern technical sphere involves the increase of mathematics training level that, in its turn and developing abstract thinking, allows to use mathematical methods for building math models of applied engineering tasks and their solving. That is why the specificity of the professional training of students of technical specialties consists not only of obtaining new math knowledge but also of instilling the need of utilizing mathematical techniques and methods in future professional activity.

Teaching students systematically to apply mathematical methods they learn in the math course to solve applied tasks must be necessarily implemented by

major departments of the technical university. Only in this case student can be assured in usefulness and necessity of using and being acknowledged of mathematical methods in his profession. There will be the significantly greater benefit from learning mathematics in the case if it is widely utilized in presentation of major disciplines during the whole education process in the university [1, p. 102].

Resources

1. Кудрявцев Л.Д. Мысли о современной математике. Москва: Наука, 1977. С. 112.