The transition to a two-tier educational system puts forward new requirements for the bachelor's and master's degrees. The main characteristic of the quality of professional training at technological university is a graduate’s professional competence the ability to effectively solve problems in the sphere of professional activity. The drafts of third-generation standards include versatile and professional competencies of bachelor of technology that require development of design and constructional abilities. Bachelor’s professional training provides the opportunity to continue education for master’s degree as a future research engineer or to receive special training as a process engineer. Skills related to mathematical modeling, which use software and depend on the development of independent activity in the process of mathematical training, occupy the prominent place in this competence. Priority to the development of nanotechnology and information technology advances as the core competencies of bachelors of technology ability of designing and reconstruction of equipment, process flow sheet, requiring fundamental training and skills of independent cognitive activity. The professional competence of technological university’s graduates in many respects depends on the fundamental mathematical education which focuses on broad spheres of science and technology knowledge, covering a large set of similar specialized spheres to achieve deep interdisciplinary connections. The mathematical component of professional competence involves the formation of professionally applied mathematical competence at 1-2 courses, consolidation of this competence into general professional disciplines (3-4 courses), additional mastering of applied mathematical methods in the process of special mathematical training at a level sufficient for the application of these methods in professional problems solving and in a further self-development of expert. The differences in the mathematical component of professional competence of engineer’s and master’s degrees are related to the following aspects: engineers must achieve a level of practical guidance in the use of mathematical methods whereas master level requires research orientation, i.e. selection and use of mathematical methods in problem situations [1, 2]. Due to the reduction of classroom time, independent work plays a major role in the preparation of highly qualified professionals. At the same time with an increase in the proportion of independent work in the process of professional training of bachelors and masters of technology, students are not ready for independent activity in the process of mathematical preparation and use of mathematical modeling in solving applied mathematical problems. It is impossible to form professional competence of bachelors and masters of technology when design and constructional abilities of students are undeveloped [3]. Based on the analysis of the State educational standards operating in technological university, curricula, the needs of special disciplines and professional analysis of bachelors and masters professional activity, research on the problem of self learning and cognitive activity, there were established and developed pedagogical conditions for the development of independent activity, as well as the content of mathematical preparation of bachelors and masters in direction 240100 "Chemical

Technology and Biotechnology." A model of the development of independent activity in the process of mathematical preparation was developed for the successful formation of professional competence; this model includes the content and organization of independent work as a means of development and self-development of design and constructional abilities in conjunction with the acquisition of mathematical methods. Designing of the content of independent activity was carried out in the form of a set of independent mathematical works with a hierarchical multidimensional structure defined by the levels of the development of design and constructional abilities and levels of activity (reproductive, reproductive-productive, productive and productive-creative). Designing of the organization of independent work was presented in the form of a gradual process of level differentiation, proper pedagogic supervision and monitoring on the basis of the criteria of development and self-development of design and constructive abilities. The organization of students' independent work in the process of mathematical preparation is based on the differentiation of students into the subgroups of users (4 levels) and researchers, usage of the standard and individualized training projects, materials for electronic security, tests for activating independent work and increasing the level of users (at least for one level), the development of self-knowledge, self-awareness, self-control, and, ultimately, self-development of design and constructive abilities as a key element of professional competence [4]. Criteria for the development of design and constructive abilities are formed on the basis of a rating system. The coefficient of development of design and constructive abilities with the integration of mathematical methods: kst.= , 0 ≤pst. ≤60+ α are based on a semester's rating, where α extra points for the implementation of research training projects. 60 points include the implementation of standardized training projects (15-20 points) and 40 points are given for tests scheduled for a semester. Identified levels: I level: 0 kst.0,5 a group of P1, II level: 0,5≤kst.0,7 a group of P2, III level: 0,7≤kst.0,9 a group of P3, IV level: 0,9≤kst.1 a group of P4, V level: kst.≥1 Group I. The organization of independent activities includes 3 stages, each of which has a proper pedagogical support (directing, guiding, orienting); different types of independent mathematical works (IMW) in accordance with the induced classification, besides, various subgroups of students can simultaneously run different stages. Throughout the semester, student's complete standard training projects with the individualization by the subgroups and the project's defense is taken after improvements at the end of a semester. Textbooks, practice tests on theory and practice are used for this purpose, as well as electronic software is created for independent activities. Rating is systematically conducted (with the reporting of results to students), taking into account the development of skills. Besides, for a better understanding of the basic part by bachelors, masters develop study guides with additional chapters of higher mathematics of individual sections of the course. Testing can be used for correction as an intake academic performance rating. Computer tests are developed to allow students to check their level of knowledge, to prepare for the

tests and independent works, as well as for exams, explore on their own some of the sections [5, 6]. The use of the computer testing on the higher mathematics course, the defense of term theses with an intensive mathematical part by first/second-year students and graduate students also makes it possible to activate current knowledge and skills. It leads to the successful mastering of the educational material of specific disciplines.