ХИМИЯ, БИОЛОГИЯ, ГЕОГРАФИЯ ЖӘНЕ ЭКОЛОГИЯНЫ ОҚЫТУ ӘДІСТЕМЕСІ
МЕТОДИКА ПРЕПОДАВАНИЯ ХИМИИ, БИОЛОГИИ, ГЕОГРАФИИ И ЭКОЛОГИИ
METHODS OF TEACHING CHEMISTRY, BIOLOGY, GEOGRAPHY AND ECOLOGY

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METHODOLOGICAL ASPECTS OF AN ELECTIVE COURSE IN ELECTROCHEMISTRY

Abstract

The article describes the main purpose of the course, designed for students and teachers who want to improve their additional knowledge of the elective course in electrochemistry. This study is aimed at students studying electrochemistry, including representatives of all fields related to chemistry. Based on this, the university plans to release a specific methodological manual on electrochemistry, organizing an elective course in the technical direction. In addition, the hours, deadlines, purpose of the elective course are determined and given in the article. On the basis of an organized application, one sample of the course is presented. The article carries out explanatory and written work, which explains why the topic proposed by the teacher is relevant and why it is useful for students. Each academic hour is discussed in detail, taking into account the general program of the University. The emphasis is placed not only on additional knowledge on the topic, but also on the list of literature and scientific materials used in the preparation of the elective course. The curriculum includes theoretical and practical classes. During the lesson, the use of modern technologies and interactive tools is provided. The presented coursework differs from traditional lecture seminars and laboratory work and includes assessment tasks. Students taking the course can test their knowledge by acquiring in-depth knowledge through the courses. In addition, the main goals and objectives of the elective course in electrochemistry, which is the basis of the article, are defined. At the end of the course, the student who has successfully completed this methodical tool specially designed for the subject of electrochemistry will receive a certificate stating that he has studied the course with a special program. In the practical part of the article, Students of the specialty electrochemistry of the Department of Chemistry of the Kazakh national pedagogical university after Abai received a questionnaire on an elective course, the results of which were determined and recorded.

Keywords: elective course, specialized trainin, electrochemistry, coursework, chemical education, modern technology, theoretical and practical classes, general program.

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МЕТОДИЧЕСКИЕ АСПЕКТЫ ЭЛЕКТИВНОГО КУРСА ПО ЭЛЕКТРОХИМИИ

Аннотация

В статье изложена основная цель курса, разработанного для учителей с обучающимися, желающими усовершенствовать дополнительные знания элективного курса по электрохимии. Это исследование было направлено на студентов, изучающих электрохимию, включая представителей всех областей, связанных с химией. Исходя из этого, университет планирует выпустить конкретное методическое пособие по электрохимии, организовав элективный курс по техническому направлению. Кроме того, определены часы, сроки, цель элективного курса и приведены в статье. На основе организованной заявки представлен один образец курса. В статье проводится пояснительная и письменная работа, в которой объясняется, почему предложенная учителем тема актуальна и почему она полезна для учащихся. Каждый академический час подробно обсуждается с учетом общей программы университета. Особое внимание уделяется не только дополнительным знаниям по теме, но и списку литературы и научных материалов, используемых при подготовке элективного курса. Учебная программа включает теоретические и практические занятия. В ходе занятия предусмотрено использование современных технологий и интерактивных средств. Предла- гаемая курсовая работа отличается от традиционных лекционных семинаров и лабораторных работ и включает оценочные задания. Студенты, проходящие курс, могут проверить свои знания, углубившись в курсы. Кроме того, определены основные цели и задачи элективного курса по электрохимии, который является основой статьи. По окончании курса студент, успешно освоивший данное методическое пособие, специально разработанное для предмета электрохимия, получит сертификат о том, что он изучил курс по специальной программе. В практической части статьи студенты кафедры химии Казахского национального педагоги- ческого университета имени Абая по специальности электрохимия получили анкетирование по элективному курсу, результаты которого были определены и записаны.

Ключевые слова: элективный курс, профильное обучение, электрохимия, курсовая работа, химическое образование, современные технологии, теоретические и практические занятия, общая программа.

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ЭЛЕКТРОХИМИЯ ПӘНІНЕН ЭЛЕКТИВТІ КУРСТЫҢ ӘДІСТЕМЕЛІК АСПЕКТІЛЕРІ

Аңдатпа

Мақалада электрохимия бойынша элективті курсты қосымша білімдерін жетілдіргісі келетін білім алушылармен ұстаздарға арналып жасалған курстың негізгі мақсаты баяндалған. Бұл зерттеу электрохимияны оқитын студенттерге, оның ішінде химиямен байланысты барлық салалардың өкілдеріне бағытталған. Осыған сүйене отырып, авторлар университетте

техникалық бағыт бойынша элективті курсты ұйымдастыра отырып, электрохимия бойынша нақты әдістемелік құрал шығаруды жоспарлап отыр. Сонымен қатар, элективті курстың сағаттары, мерзімдері, мақсаты анықталып, мақалада келтірілген. Университеттегі оқу бағдарламасы негізінде курстың бір үлгісі ұсынылған. Мақалада курс бойынша түсіндірме және жазбаша жұмыс жүргізіледі, онда оқытушы ұсынған тақырыптың неліктен өзекті екендігі және оның білім алушылар үшін неліктен пайдалы екендігі түсіндіріледі. Элективті курста әрбір академиялық сағаттарда университеттің жалпы бағдарламасын ескере отырып, егжей-тегжейлі талқыланады. Тақырып бойынша қосымша білімге ғана емес, сонымен қатар элективті курсты дайындауда қолданылатын әдебиеттер мен ғылыми материалдардың тізіміне де баса назар аударылады. Оқу жоспарына теориялық және практикалық сабақтар кіреді. Сабақ барысында заманауи технологиялар мен интерактивті құралдарды қолдану қарастырылған. Ұсынылған курстық жұмыс дәстүрлі дәріс семинарлары мен зертханалық жұмыстардан ерекшеленеді және бағалау тапсырмаларын қамтиды. Курстан өтіп жатқан студенттер осы элективті курс арқылы терең білім ала отырып өз білімдерін тексере алады. Сонымен қатар, мақаланың негізі болып табылатын электрохимиядағы элективті курстың негізгі мақсаттары мен міндеттері анықталған. Электрохимия пәніне арнайы жасалған бұл әдістемелік құралды нәтижелі аяқтаған білім алушы курстың соңында арнайы программамен жасалған курсты оқыды деген сертификат алады. Мақаланың практикалық бөлімінде Абай атындағы Қазақ ұлттық педагогикалық университетінің химия кафедрасының электрохимия бойынша сабақ оқитын студенттерден элективті курс бойынша сауалнама алынды және оның нәтижелері анықталып, қорытынды жазылды.

Түйін сөздер: элективті курс, мамандандырылған оқыту, электрохимия, курстық жұмыс, химиялық білім, заманауи технологиялар, теориялық және практикалық сабақтар, жалпы бағдарлама.

Basic rules. With the development of modern science and technology in Kazakhstan, there are almost no special platforms for post-university students who want to deepen their knowledge in the field of electrochemistry and students who want to study this subject. Students' interest in the subject is low. It is necessary to carry knowledge and experience along with explaining to the students the importance of electrochemistry subject in human life and the areas of its application by using new teaching technologies. Students' interest in electrochemistry contributes greatly to their knowledge, skills and experience, as well as scientific discoveries.

Introduction. The main goal of the modernization of education is to train students with intellectual knowledge, chemical knowledge and spiritually developed citizens who are responsible for their profession, as well as to meet the needs of students in education. In modern times of rapid development of science and technology, the formation of human capital capable of competing for the economic well-being of the country is one of the main tasks for the state. In the 21st century, a new paradigm of education is emerging at every stage, the main of which is the formation of the need and ability of the student to independently create new knowledge in the process of forming it into his brain, acquiring ready-made knowledge with the knowledge he already has, mastering cognitive methods, as well as practical skills. Within the framework of the development of the New Kazakhstan, the goal of the new education is to form a person who is free, ready for individual intellectual efforts and humanistically oriented, has the ability to choose, as well as multifunctional competencies, to independently solve various problems in everyday life. Based on these requirements, specialized training of elective courses is planned [1, p23].

Main part. The main ***porpouse*** of education with elective courses: the formation of consciousness, behavior, culture of the individual in the field of Chemistry at the highest level.

The student learns these qualities with knowledge, in the process of Education. Today, the issue of continuing education and upbringing is being raised at the state level. Human community, society, nature and the environmentexplain to posterity the most effective ways of harmony. Including in the process of effective use of the environment and its natural resources a man who is able to protect and care for nature, and human. It is important to educate a new generation with higher chemical education and culture it happens. Maximum inhibition of the increase in the chemical crisis, nature teaching young people about the methods of environmental protection, Chemical Education it is implemented only as a result of mass and continuing education.

1. Electrochemical education in chemistry classes through elective courses responsibilities:

2. Conditions for improving theoretical knowledge in chemistry to create.

3. Disclosure of the consequences that occur as a result of phenomena occurring in nature and modern times, thanks to the chemical knowledge mastered.

4. Interdisciplinary in chemical education in chemistry lessons it is necessary to organize contacts.

5. Information from local local materials is widely available must be used.

6. Importance and harmfulness of obtained chemical products definition [2, p3].

Elective courses for independent, independent work of students effective ways to create conditions and improve the quality of education an opportunity to broaden the research nature of educational work will give.

Basic principles of the elective course:

1. Information on different topics at the discretion of each student.

the purpose of the event is to provide the opportunity to gather and express your thoughts.

2. Consider each student as an individual and consider his / her interestsit is necessary to try to wake up. The teacher constantly keeps information about the student's search it is necessary.

3. The required information is available in a wide range, depending on the needs of students it is given.

4. Students are not graded.

5. The student publishes his sought-after Works and assesses himself. Quarter at the end, you can get test works on the mastered topics.

6. There is also an elective course-creative search, research at the present time work and collective communication, game accumulation, widely used in order to increase interest in the subject type of pedagogical work.

7. To improve the chemical literacy of students at the present stage to the global trends for the development of chemical education it is better to lean as much as possible [3, p7].

- Minimization of the learning content, determining the invariant part he purpose of the event is tidentify the relationship between theory and practice;
- Strengthening of integrated processes, consistency, students;
- Organization of work in small groups;
- Increase of independent work, study of educational work;

wide distribution of character (teacher who serves as a source of knowledge and information.

- The model is gradually lagging behind in the new system of its teaching, leadership, didactic and educational solution of educational tasks organizational skills are revealed taking into account the specifics);
- Electronization of the content of chemical education, other natural sciences and integration;
- Mathematical apparatus, computerization, quantitative chemical the results of the experiment (based on the computer), multimedia and strengthening the role of the internet;
- Formation of the basis of the academic discipline in the student [4, p198].

Research materials and methods. If we answer the question of what an elective course and specialized training is: an elective course is a compulsory subject, which is determined by the educational profile of students of their choice, which is carried out at the expense of the time allocated to the component of a particular educational institution. Selective courses can complement the content of a specialized course; developing the content of one of the main courses is to meet the diverse cognitive needs of schoolchildren that go beyond the chosen educational profile [5]. And profile training is a means of individualization and differentiation of education, which, due to changes in the structure, content and organization of the educational process, fully allows the student to conduct scientific work in the future, deepening his interests, as well as knowledge as an integral part of the chosen specialty [6]. One of the main goals of studying an elective course is to focus on the individualization of education and socialization of the student, preparing for a conscious and responsible choice of the future field of professional activity. According to this, it is divided into several functions [7, p5]. Separately, the following functions of elective courses are: study of current problems of our time; orientation of the student to the peculiarities of future professional activity; orientation to improving the skills of cognitive, organizational activity; replenishment and deepening of basic subject education; compensation for shortcomings in teaching profile disciplines. Each of these functions can be significant and leading in its own way, but in general, the elective course is considered mandatory to perform them in a comprehensive manner. The technology of developing elective courses at the same time, understanding their place and role in the curriculum of a higher educational institution, the features of the methodology of teaching elective courses pose great difficulties for teaching teachers. Therefore, it is important to develop a long-term plan, providing an elective course. Elective profile courses to a greater extent are aimed specifically at deepening and expanding the subject knowledge of students in a particular subject, deepening their knowledge in a higher educational institution so that in the future they become competitive specialists [8, p178].

The main goal of the considered APP of the elective course is to select the content of the elective course "Electrochemistry" to increase the knowledge of students. For this purpose, several tasks are defined:

1. Literary review of the content of the elective course on the subject of electrochemistry;
2. Definition of the main concepts in the course in this discipline;
3. Development of the program and content of the elective course in the discipline electrochemistry;
4. Testing of the site of the compiled elective course on the subject of electrochemistry from students of a specialized university studying bioorganics and students who want to deepen their additional knowledge[9, p150].

If we talk about the main differences and advantages of the new elective course from the traditional elective course:

- It is very effective to apply this course in a simplified direction to all universities, colleges, schools, as well as students and teachers who want to improve their knowledge.
- The student, receiving in-depth knowledge in this discipline, is also aware of additional information.
- Because of the new technological method, both smartphones and laptops have the opportunity to open the subject and test their knowledge and repeat the previous lesson at any time and anywhere only if there is an internet network.
- One of the main differences between the elective course in the new style and the traditional elective course is that the student saves a lot of time during the study of the subject, which he spends on lectures, in the laboratory and on tests. For example, to study a traditional elective course, student spends at least 60 minutes attending classes offline, and in the new traditional elective

course, the student has the opportunity to master the existing information in the lecture in just 20 minutes[10, p8].

As an auxiliary tool in the development of a specially designed elective course on the discipline" electrochemistry", a syllabus approved by the university walls according to the aranai standard program was used. During the preparation of a course on electrochemistry with a comparison of textbooks and a standard curriculum, 2 modules, 1 Test and 1 laboratory work for each module after 7 tsur, as well as at the end of 1 module, one test for the same module and at the end of 2 modules, a certificate of completion of knowledge in the discipline is issued by answering the exam question, and a separate section of this discipline is created for students in three languages. In general, 15 hours will be considered. In connection with this study, before creating an elective course, a schematic version of the structure of the first course was drawn up using a syllabus specially attached to the subject. The data presented in figure 1 show the main scheme of knowledge that the student receives in the general course.

Figure –1. Compiled schematic version of the elective course on the subject of electrochemistry

Since the site of the elective course is currently being developed, before creating the course, teachers of the Department of chemistry of the Institute of Natural Sciences and geography of the Kazakh National Pedagogical University named after Abai in Almaty were surveyed by students studying this discipline, together with the need for the course being developed and their attitude to the course in connection with this discipline. A total of 50 students and teachers of the department received the following questionnaires. We can see the results in figure 2.

A special questionnaire for teachers and students of the Department of chemistry on the development of an elective course on electrochemistry

1. Should elective courses primarily contribute to a deeper study of the student's chosen subject?

A) Yes B) No C) I don't know

2. Do you choose an elective course in electrochemistry in order to further deepen your knowledge?

A) Yes B) No C) I don't want to answer

3. Does the elective course in electrochemistry matter to you or your students in their future specialty?

A) Yes B) No C) I don't know

4. Should the student's recommendations for conducting elective courses be taken into account?

A) Yes B) No C) I don't know

5. Do you think it is better to take elective courses not in the traditional format, but in different formats, including the organizational skills of the teacher?

A) Yes B) No C) I don't know

6. Should the organization of elective courses be accompanied by classes on the school day?

A) Yes B) No C) I don't know

7. Is electrochemistry a subject that is difficult for you or your students to master, requiring additional lessons?

A) Yes B) No C) I don't know

8. Do you know how the elective course differs from the main one?

A) Yes B) No C) I don't know

9. Do you think it is important to have elective courses in electrochemistry apart from the traditional one?

A) Yes B) No C) I don't know

10. Should the topic of elective courses cover topics from the electrochemistry course?

A) Yes B) No C) I don't know

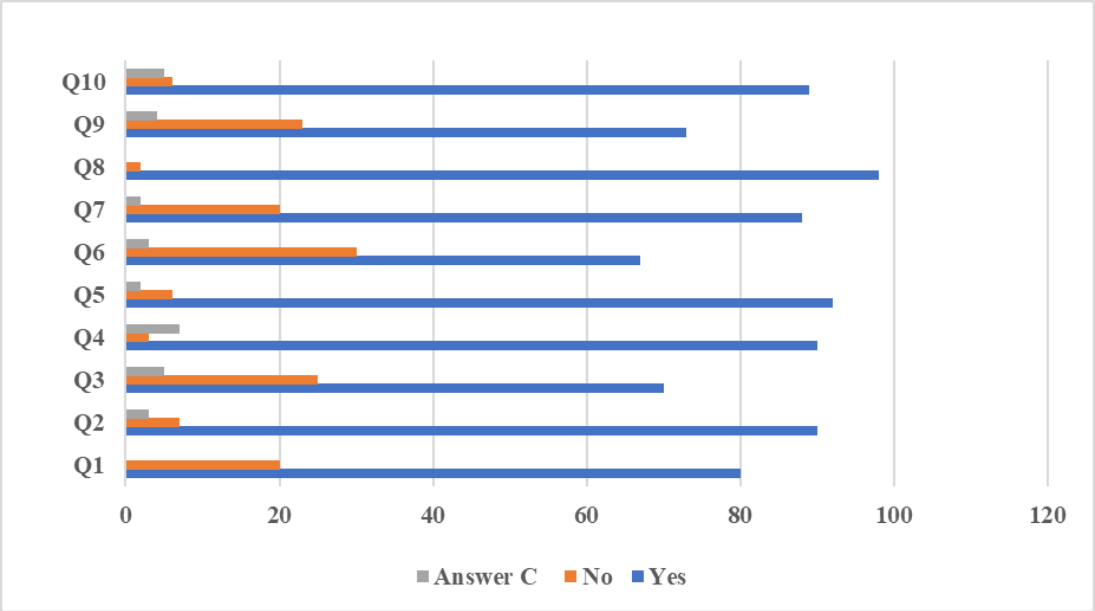

Figure – 2. Survey result

Result. The results of the survey in Figure 2 showed that the response of teachers and students proved that the standard training program has a small number of hours to solve a complex topic, additional education is needed. To be more precise, according to a survey of students, we can see that the number of students who answered yes to all questions is higher than 65%, and the answer No was given by 30% of the total number of students, and 5% of students chose the option that they do not know or do not want to answer.

Discussion. An elective course in electrochemistry is required for the following students: The program of the elective course we have developed relates to the subject, in it separate sections of the specialized chemistry course included in the compulsory program of this subject are studied in depth.

The course is aimed not only at students with sufficient preparation, showing interest in the subject and wishing to deepen their knowledge, skills and abilities, but and for those students who wish to acquire additional knowledge on this topic.

The main necessary structural components of the program have been developed for the course elective course: explanatory note, program content, calendar-thematic plan, program content of the

course, methodological recommendations on the content and conduct of classes, list of literature recommended for students, list literature for teachers.

Conclusion. In conclusion, elective courses in electrochemistry can be considered as an effective form of training in the formation of personal-semantic, educational-cognitive and communicative-informational competencies for students of higher educational institutions who also want to receive additional education. In addition to mastering the content of the discipline, students are currently focused on the formation of the student's readiness to receive a specialized education, taking into account their capabilities, interests, preferences in advance as a competitive person in the future. The completed survey method, test results , program of the elective course, calendar and thematic plan, compiled on the basis of the discipline electrochemistry, and methodological instructions for lectures for conducting this discipline are being prepared. Before the development of the course program, a pedagogical experiment was carried out. As a result of the experiment, the focus was on the development of the elective course. As the results of the survey of students showed, that is, as a result of the survey of 50 surveyed students and teachers, it can be seen that 70-100 percent of the total 50 surveyed participants require an elective subject. In general, we can see that elective courses are successfully included in the profile education system and are an excellent tool for the development of students of higher educational institutions and those who increase their knowledge and become professionally qualified specialists in the future.

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