

Для впровадження ОСР в освітянські програми необхідне створення умов для практичної екологічної і природоохоронної роботи вихованців і учнів дошкільних і шкільних навчальних закладів, залучення дітей та їх родини до природоохоронних акцій, створення дитячих природоохоронних організацій, підтримка органами державної влади та місцевого самоврядування роботи навчальних закладів щодо організації навчальних виїздів на природу, залучення студентів ВНЗ до волонтерської роботи з учнями шкіл.

PECULIARITIES OF TRAINING SPECIALISTS IN THE IMPLEMENTATION OF THE CAR RECYCLING SYSTEM IN UKRAINE

*Olena Pozdnyakova, assoc. prof., cand. of chem. science,
Kharkiv National Automobile and Highway University
Ukraine
pei.xadi@gmail.com*

In the XXI century the role of distance education in the international practice of higher education has fundamentally changed. It has turned into one of the most popular and highly effective models used all over the world. Distance education is traditionally understood as the process of individual self-learning of information using digital media, without the presence of a teacher, who becomes the coordinator of the educational process.

At the moment, the auto-recycling system has just begun to take shape in Ukraine, and for its development and implementation in production, specialists are needed who will be knowledgeable about issues of environmental protection and

*Збірка матеріалів 88-ї Міжнародної науково-технічної та науково-методичної конференції університету. Секція кафедри ЕКОЛОГІЇ.
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resource conservation in the process of recycling vehicles. Until now, Ukraine does not have a single law regulating the disposal of end-of-life vehicles. Already at the beginning of 2011, there were about 2.1 million passenger cars in the structure of the car fleet of Ukraine, which were manufactured before 1985. The volume of their annual disposal can amount to 210,000 cars per year. In recent years, the construction of new modern enterprises for the disposal of used lubricants, batteries, shredder plants for the disposal of car bodies and worn tires has begun in Ukraine. Military actions on the territory of our country have stopped this process, but, in our opinion, it is necessary to train specialists who will be able to take an active part in the formation of the auto- recycling system in Ukraine in the near future.

Taking into account all these factors, a new discipline was developed at the Department of Ecology of the KhNADU, the purpose of which is to prepare specialists for the organization and regulation of production processes in the field of transport vehicles and transport technologies in a way that would ensure rational use of nature and minimization of the consequences of the production, operation and disposal of motor vehicles on the state of the environment using resource-saving technologies. The subject of the discipline is the regularities of the formation of the system of recycling cars and auto components and the specific features of the ecological aspects of the technological processes of secondary processing and recycling of vehicles. The main sections of the syllabus of the discipline are reflected in the textbook. The educational discipline "Resource-saving and environmental protection technologies in transport" is taught to students of the 2nd level of education in the specialty 101 Ecology in the field of knowledge 01 Natural sciences. The main tasks of the discipline are the formation of the acquirers of knowledge, skills and ideas about the modern world experience of organizing the system of disposal of end-of-life vehicles (EVA), the use of resource-saving and environmental protection technologies for recycling vehicles after the end of their life cycle and the conditions for their use in industrial

production in Ukraine. As a result of studying the discipline, the student of the 2nd level of education should know:

- the best experience of countries with a developed automobile industry in the formation of the legislative and regulatory framework and the organization of the disposal of VE;

- peculiarities of the processing of metal parts of the VEA;

- peculiarities of the processing of plastic parts of VEA;

- resource-saving technologies for recycling auto components, namely, batteries, engines, catalytic converters, electrical and electronic equipment, and worn tires;

- regularities of technological processes of recycling of working fluids and the field of their application in industrial production;

- the main directions of industrial, legislative and economic activity, which are necessary for the organization of the auto-recycling system in Ukraine.

As a result of studying the discipline, the applicant should be able to: use international reference and normative literature in the field of secondary processing and recycling of vehicles; carry out primary analysis and identification of plastic parts of cars in order to sort them during secondary processing. In accordance with the requirements of the Directive 2000/53/EC, calculate the recycling coefficient and the utilization coefficient of VEA in accordance with the requirements of the ISO 22628 standard and decide on the direction of their utilization. To analyze indicators of energy efficiency and reduction of greenhouse gas emissions in the transport industry in accordance with the requirements of Directive 2009/33/EC with the help of a specialized computer program and to determine ways to reduce the impact of motor vehicles on the environment.

The structure of the discipline is formed from a theoretical course of lectures and practical classes and consists of 3 meaningful blocks.

The first substantive block is devoted to the issues of forming a legislative and regulatory framework in the field of waste disposal and auto components. It

characterizes the current state of the problem of disposal of VEA. Priority tasks for processing and disposal of motor vehicle waste in Ukraine are determined.

The second substantive block is devoted to the analysis of technologies for the recycling of metal parts of vehicles, in particular, the specific features of the processing of ferrous metal scrap from motor vehicles. Special attention is paid to the analysis of ecological aspects of the technological processes of disposal of scrap lead batteries. The significant growth in the production of electric vehicles in recent years has led to the generation of specific waste lithium-ion batteries at the next stage, the amount of which will grow rapidly in the future. Therefore, a separate topic is devoted to the analysis of the environmental component of such devices during the entire life cycle and the environmental aspects of specific technologies for the disposal of toxic components of lithium-ion batteries.

In recent years, spent catalytic converters have become an increasingly powerful source of secondary platinum and other platinum group metals. A separate section is devoted to the determination of ecological and economic problems and the advantages of various technologies for their disposal.

The third meaningful block is devoted to the disposal of non-metallic parts of the VEA. The need to use the IMDS and GADSL International system and database of automobile components and materials in the design and disposal of automobiles is substantiated. The requirements of international standards for marking and use of plastics in cars are given. The state of the problem of disposal of lubricants in the world and in Ukraine is characterized.

Acquirers consolidate theoretical knowledge in practical classes that have different topics. For example, one of the researchers allows you to identify plastics by the nature of their combustion, as burning plastic samples is a fairly reliable way of their identification. Collectors conduct an analysis of the behavior of a plastic sample in an open source of fire, as well as the products of the accompanying oxidation process (character of combustion, emitted smell, sound). The obtained results are compared with the known behavior of standard samples of

plastics during combustion. According to the results of the experiment, it is possible to divide the mixture of plastics into 2 groups: thermoplastic polymers, which are subject to recycling, and thermoset polymers, from which it is not possible to obtain secondary raw materials and therefore they are subject to burning or burial in special landfills.

With the help of a special computer program of the ecological calculator, the impact on the environment of motor vehicles during the entire life cycle is determined. The program was created by specialists of the Volvo corporation to estimate the consumption of energy, water, emissions of the main toxic substances of exhaust gases and carbon dioxide for Volvo tract.

Based on the results of the calculations, applicants have the opportunity to evaluate the effectiveness of the use of various types of biodiesel fuel in comparison with traditional diesel fuel and draw conclusions about its comprehensive impact on the environment throughout the entire life cycle of a motor vehicle. The results of the practical work convince the applicants that when evaluating the effectiveness of certain areas of improving the environment, it is necessary to apply a comprehensive approach that analyzes the activity of the motor vehicle throughout its life cycle.

This approach makes it possible to find the optimal ratio between the positive and negative consequences of using any solution, namely biodiesel fuel, and to prevent the increase in the consumption of natural resources and the emission of certain substances while reducing the impact of other environmental pollutants such as carbon dioxide.

In our opinion, the organization of an effective auto-recycling system in Ukraine will provide a solution to a number of the most important environmental problems, new jobs and new financial revenues to the budget of Ukraine. After the end of the war, a large amount of military equipment, including cars, will need to be disposed of, which, on the one hand, will contribute to the improvement of the

environment, and on the other hand, will lead to the saving of natural resources due to the use of waste.

In our opinion, specialists in the field of resource and energy saving will be very necessary in Ukraine. Kharkiv National Automobile and Road University has full methodological support and everything necessary to train such specialists.

ОСОБЛИВОСТІ ВИКЛАДАННЯ ДИСЦИПЛІНИ «ЕКОЛОГІЯ» В ТЕХНІЧНОМУ ЗВО

*Прокопенко Н.В., доц., к.б.н.
Харківський національний автомобільно-дорожній університет,
Україна
natvikpro08@gmail.com*

Формування нового екологічного мислення, так необхідного для сталого соціально-економічного розвитку країни, неможливе без обов'язкового екологічного виховання та освіти, без широкого розповсюдження екологічних знань.

Це необхідно для того, щоб екологічно обґрунтована професійна діяльність стала нормою в повсякденній практиці.

Але, на жаль, екологічна освіта часто має суто ознайомлювальний, необов'язковий характер, тому, прослухавши курси екологічного спрямування, склавши заліки або іспити, здобувачі достатньо швидко їх забувають. За останні роки, до 2022 року, основна частина населення України отримала в тому чи іншому вигляді достатні екологічні знання, і ми мали б уже жити в сприятливій екологічній обстановці, але дійсність свідчить про інше. Опитування здобувачів різних курсів, в тому числі і заочного