SYLLABUS OF THE ACADEMIC DISCIPLINE "COMPUTER SCIENCE"

Academic degree	**Bachelor**
Academic program	**Electric Power Engineering, Electrical Engineering and Electromechanics**
Duration	I-III quarter
Classes:	2021 - 2022 years of study

Type of classes:

Lecture:	2 hours a week - I-III quarter
Practical:	1 hours a week - I-II quarter
Laboratory:	2 hours a week - I-II quarter
	1 hours a week - III quarter
Language	English
Department	Information technology and computer engineering

Distance courses
https://do.nmu.org.ua/course/view.php?id=3446

Information about lecturers:

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1. Course abstract

In recent years, powerful tools for verifying software and hardware systems have been developed. Computer Engineering has been contributing the world for the overall development and creating job or employment opportunities in both public and private sectors. This curriculum is designed to foster knowledge and skills to the technician required by the compute engineering and information technology related industries, electrical engineering.

This course covers the fundamentals of computer and mobile device hardware and software, and advanced concepts such as security, networking, programming and the responsibilities of an IT professional. Students who complete this course will be able to describe the internal components of a computer, assemble a computer system, install operating systems, and troubleshoot them using software tools and diagnostics. Students will also be able to connect to the Internet and share resources in a networked environment. New topics in this version include scripting basics, using remote access technologies, IoT device configuration and communication types, documentation and change management best practices, and also, disaster prevention and recovery methods.

Upon completion of the “Computer engineering and programming” course, students will be able to perform the following tasks:

– select the appropriate computer components to build, repair, or upgrade personal computers;

– install and configure components to build, repair, or upgrade personal computers;

– perform troubleshooting on personal computers;

– explain how computers communicate on a network;

– configure devices to communicate on a network;

– explain how to troubleshoot laptops and other mobile devices;

– install a printer to meet requirements;

– describe virtualization and cloud computing;

– install Windows operating systems;

– perform management and maintenance of Windows operating systems;

– explain how to configure, secure, and troubleshoot mobile and operating systems;

– developing the simpler console programs based on the acquired knowledge on building algorithms and programming skills in C ++ language.

2. The purpose and objectives of the discipline

The purpose of the discipline " Computer engineering and programming " is introduce to the fundamentals of computer hardware and software and covered are mobile devices, virtualization and cloud computing, as well as expanded information about Microsoft Windows operating systems, security, networking, troubleshooting, and the responsibilities of an IT professional.

Course objectives:

- select the appropriate computer components to build, repair, or upgrade personal;
- install components to build, repair, or upgrade personal computers;
- install and configure components to upgrade a computer;
- perform Troubleshooting on personal computers;
- configure devices to communicate on a network;
- explain how to configure, secure, and troubleshoot mobile, and operating systems;
- building algorithms and programming skills in C ++ language.

3. Learning outcomes

1. The ability to solve common and complex specialized tasks and practical problems in the professional activities using theories and methods of computer logic.
2. The ability to integrate knowledge and solve complex issues, to formulate judgments for insufficient or limited information.
3. To reveal clearly and unambiguously conclusions and knowledge, reasoning them, to the professional and non-professional audience.
4. The ability to apply knowledge in practical situations.
5. Skills in the use of information and communication technologies.
6. The ability to abstract thinking, analysis and synthesis.
7. To be able to use a logic programming language and its implementations.

4. The structure of the discipline

LECTURES

1 semester	
Lecture 1	Introduction to course “Computer engineering and programming”: history and motivation.
Lecture 2	Introduction to Personal Computer Hardware
Lecture 3-6	Personal Computer Hardware: Cases. Power Supplies. Connectors. Power Supply Voltage. Motherboards. Motherboard Components. Motherboard Connections
Lecture 7	Motherboard Chipset. Motherboard Form Factors
Lecture 8	CPU. Types of Memory
Lecture 9	Storage Device and their Interfaces.
Lecture 10	Optical Storage Devices. Video Ports and Cables
Lecture 11	Input and Output Devises. General Tool

Lecture 12	Basic Input and output System. Boot the Computer
Lecture 12	Computer Network
Lecture 13	Introduction C++. Numbering systems.
Lecture 14	Basic concepts of algorithmization of computational processes
2 semester	
Lecture 1	Numbers and their operators
Lecture 2	Integer values, integer variables and comments
Lecture 3	The conditional statement: if, else, switch
Lecture 4-5	Loops: ***while, do … while*** and ***for***
Lecture 6 -8	One-dimensional and two-dimensional arrays

LABORATORY WORKS

1 semester	
Laboratory work 1	Basic components of a personal computer in HWINFO64.
Laboratory work 2	Components on the motherboard.
Laboratory work 3	Build a Specialized Computer System.
Laboratory work 4	Diagnostic Software.
Laboratory work 5	Boot the Computer.
Laboratory work 6	BIOS Setup Utility and Common Trouble Shooting
Laboratory work 7	Configure Computer Network
Laboratory work 8	Numbering systems
2 semester	
Laboratory work 1	Introduction to Microsoft Visual Visual C++. Types of projects. Creating a project in Microsoft Visual Studio
Laboratory work 2	Algorithms. Basic concepts and properties
Laboratory work 3	Programming of linear algorithms
Laboratory work 4	Development of structured programs
Laboratory work 5	Development of the program with loop process
Laboratory work 6	Development of a program with one-dimensional and two-dimensional arrays. Search for elements, sort arrays

PRACTICAL WORKS

Practical work 1	**Study of the purpose, scheme and principles of operation of systems (components) of PC components and consideration of their main characteristics:**
	– the Motherboard;
	– CPU;
	– Types of Memory;
	– HDD, SSD;
	– Power supply system;
	– Cooling Systems;
	– Input and output system;
	– PC peripherals.

Practical work 2	**Complete the Computer Assembly.**
Practical work 3	**Disassemble a Computer.**
Practical work 4	**Complete the Laptop Assembly.**
Practical work 5	**Disassemble a Laptop.**

5 Hardware and / or software

1. A personal computer or laptop with constant access to the Internet.
2. Activated university mail account (student.i.p. @ Nmu.one) at Office365.
3. Active account in the distance education system Moodle.
4. Software:

- Windows 10 platform;
- HWINFO64;
- Microsoft Office or LibreOffice;
- Internet browser;
- MS Visual Studio Community 2019;
- LibreOffice 6.4;
- Windows 10;
- MS Office 365;
- Virtual Desktop;
- Virtual Laptop;
- distance learning platform Moodle, MS Teams.

6 Knowledge progress testing

Certification of student achievement is accomplished through transparent procedures based on objective criteria in accordance with the University Regulations "On Evaluation of Higher Education Applicants' Learning Outcomes".

The level of competencies achieved in relation to the expectations, identified during the control activities, reflects the real result of the student's study of the discipline.

6.1 Grading scales

Assessment of academic achievement of students of the Dnipro University of Technology is carried out based on a rating (100-point) and institutional grading scales. The latter is necessary (in the official absence of a national scale) to convert (transfer) grades for mobile students.

The scales of assessment of learning outcomes of the NTUDP students

Rating	Institutional
90 ... 100	Excellent
74 ... 89	Good
60 ... 73	Satisfactory
0 ... 59	Failed

Discipline credits are scored if the student has a final grade of at least 60 points. A lower grade is considered to be an academic debt that is subject to liquidation in accordance with the Regulations on the Organization of the Educational Process of NTUDP.

6.2 Diagnostic tools and evaluation procedures

The content of diagnostic tools is aimed at controlling the level of knowledge, skills, communication, autonomy, and responsibility of the student according to the requirements of the National Qualifications Framework (NQF) up to the 7th qualification level during the demonstration of the learning outcomes regulated by the work program.

During the control activities, the student should perform tasks focused solely on the demonstration of disciplinary learning outcomes (Section 2).

Diagnostic tools provided to students at the control activities in the form of tasks for the intermediate and final knowledge progress testing are formed by specifying the initial data and a way of demonstrating disciplinary learning outcomes.

Diagnostic tools (control tasks) for the intermediate and final knowledge progress testing are approved by the appropriate department.

Type of diagnostic tools and procedures for evaluating the intermediate and final knowledge progress testing are given below.

Diagnostic and assessment procedures

INTERMEDIATE CONTROL			FINAL ASSESSMENT	
training sessions	diagnostic tools	procedures	diagnostic tools	procedures
lectures	control tasks for each topic	task during lectures	comprehensive reference work (CCW)	determining the average results of intermediate controls; CCW performance during the examination at the request of the student
practical	control tasks for each topic	tasks during practical classes		
	or individual task	tasks during independent work		

During the intermediate control, the lectures are evaluated by determining the quality of the performance of the control specific tasks. Practical classes are assessed by the quality of the control or individual task.

If the content of a particular type of teaching activity is subordinated to several descriptors, then the integral value of the assessment may be determined by the weighting coefficients set by the lecturer.

Provided that the level of results of the intermediate controls of all types of training at least 60 points, the final control can be carried out without the student's immediate participation by determining the weighted average value of the obtained grades.

Regardless of the results of the intermediate control, every student during the final knowledge progress testing has the right to perform the CDF, which contains tasks covering key disciplinary learning outcomes.

The number of specific tasks of the CDF should be consistent with the allotted time for completion. The number of CDF options should ensure that the task is individualized.

The value of the mark for the implementation of the CDF is determined by the average evaluation of the components (specific tasks) and is final.

The integral value of the CDF performance assessment can be determined by taking into account the weighting factors established by the department for each NLC descriptor.

6.3 Evaluation criteria

The actual student learning outcomes are identified and measured against what is expected during the control activities using criteria that describe the student's actions to demonstrate the achievement of the learning outcomes.

To evaluate the performance of the control tasks during the intermediate control of lectures and practicals the assimilation factor is used as a criterion, which automatically adapts the indicator to the rating scale:

$$O_i = 100\ a / m,$$

where a - number of correct answers or significant operations performed according to the solution standard; m - the total number of questions or substantial operations of the standard.

Individual tasks and complex control works are expertly evaluated using criteria that characterize the ratio of competency requirements and evaluation indicators to a rating scale.

7. Course policy

7.1. Academic Integrity Policy.

Academic integrity of students is an important condition for mastering the results of training in the discipline and obtaining a satisfactory grade on the current and final tests. Academic integrity is based on condemnation of the practices of copying (writing with external sources other than those allowed for use), plagiarism (reproduction of published texts by other authors without indication of authorship), fabrication (fabrication of data or facts used in the educational process). The policy on academic integrity is regulated by the Regulation "Regulations on the system of prevention and detection of plagiarism at the Dnipro University of Technology (http://www.nmu.org.ua/ua/content/activity/us_documents/System_of_prevention_and_detection_of_plagiarism.pdf.).

In case of violation of academic integrity by a student (copying, plagiarism, fabrication), the work is evaluated unsatisfactorily and must be repeated. The teacher reserves the right to change the topic of the task.

7.2. Communication policy.

Students must have activated university mail.

It is the student's responsibility to check the mailbox at Office365 once a week (every Sunday).

During the weeks of independent work it is the student's responsibility to work with the distance course "Computer science" (www.do.nmu.org.ua).

All written questions to teachers regarding the course should be sent to the university e-mail.

6.3. Reassembly policy.

Works that are submitted in violation of deadlines without good reason are evaluated at a lower grade. Relocation takes place with the permission of the dean's office if there are good reasons (for example, sick leave).

6.4. Attending classes.

Full-time students are required to attend classes. Good reasons for not attending classes are illness, participation in university events, business trips, which must be confirmed by documents in case of prolonged (two weeks) absence. The student must inform the teacher either in person or through the headmaster about the absence from class and the reasons for absence. If a student is ill, we recommend staying home and studying with a distance platform. Students whose health is unsatisfactory and may affect the health of other students will be encouraged to leave the class (such absence will be considered an absence due to illness). Practical classes are not repeated, these assessments cannot be obtained during the consultation. For objective reasons (for example, international mobility), learning can take place remotely - online, in agreement with the teacher.

6.5 Evaluation Appeal Policy.

If the student does not agree with the assessment of his knowledge, he may appeal the assessment made by the teacher in the prescribed manner.

6.6. Bonuses.

Students who regularly attended lectures (have no more than two passes without good reason) and have a written syllabus of lectures receive an additional 2 points to the results of the assessment to the final grade.

6.7. Participation in the survey.

At the end of the course and before the session, students will be asked to fill out anonymously questionnaires (Microsoft Forms Office 365), which will be sent to your university mailboxes. Completing the questionnaires is an important component of your learning activity, which will allow you to assess the effectiveness of the teaching methods used and take into account your suggestions for improving the content of the discipline "Higher Mathematics".

8 Recommended bibliography

1 semester

1 Standart vyshchoi osvity Ukrainy: pershyi (bakalavrskyi) riven, haluz znan 14 - Elektrychna inzheneriia, spetsialnist 141 - Elektroenerhetyka, elektrotekhnika ta elektromekhanika. – 22 s.

2 Kashtan V.Yu. Methodological instructions for the implementation of laboratory works in the discipline “Computer Engineering and Programming” for students of specialty 141 “Power engineering, electrical engineering and electromechanics” [Electronic resource], Part1. – 2021. URL: https://it.nmu.org.ua/ua/scientific_method_materials/teaching_materials.php.

3 Kashtan V.Yu. Computer Engineering and Programming for students of specialty 141 “Power engineering, electrical engineering and electromechanics”, 2021 Moodle. URL: https://do.nmu.org.ua/course/view.php?id=3446

4 Osnovy informatyky ta obchysliuvalnoi tekhniky: pidruchnyk / V. H. Ivanov, V. V. Karasiuk, M. V. Hvozdenko; za zah. red. V. H. Ivanova. — Kh.: Pravo, 2015. — 312 s.

5 Sarah L. Harris, David Harris. Digital Design and Computer Architecture: ARM Edition 1st Edition. – Morgan Kaufmann. – 2015. – 584p.

6 Ivanov V. H. Osnovy informatyky ta obchysliuvalnoi tekhniky: pidruch. / V. H. Ivanov, V. V. Karasiuk, M. V. Hvozdenko; zazah. red. V. H. Ivanova. – Kh.: Pravo, 2012.

7 Sommerville I. Software Engineering, 10th ed. — Addison-Wesley / Pearson Education Limited, 2015. — 816 p.

8 Elektronika ta mikroskhemotekhnika: pidruchnyk / O.M. Vorobiova, I.P. Panfilov, M.P. Savytska, Yu.V. Fleita. – Odesa: ONAZ im. O.S. Popova, 2015. – 298 s.

9 Albert Paul Malvino. Digital computer electronics. – New Delhi : Tata Mcgraw Hill Education Pvt. Ltd. – 2011. – 522 p.

10 James Lance. The Beginner's Guide to Engineering: Computer Engineering. - CreateSpace Independent Publishing Platform. – 2013. – 158p. ISBN-10 : 1492981540.

11 Cisco Academy IT Essentials Interactive Tutorial: https://netacad.com.

2 semester

1. Roger Mayne. Introduction To Windows And Graphics ProgrammingWith Visual C++ (With Companion Media Pack), 2nd Edition. – World Scientific, 2015. – 480 p.

2.Trofymenko O.H. S++. Alhorytmizatsiia ta prohramuvannia : pidruchnyk / O.H. Trofymenko, Yu.V. Prokop, N.I. Lohinova, O.V. Zadereiko. 2-he vyd. pererob. i dopovn. Odesa : Feniks, 2019. 477 s.

3.Harvey M. Deitel, Paul J. Deitel. C++ How no Program / 10th Edition. Pearson Education: 2017. 1074 p.

4. Vasyliev O. Prohramuvannia na S++ v prykladakh i zadachakh. – Lira-K, 2017. – 382 s. ISBN 978-617-7507-41-2.