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INTERNATIONAL EUROPEAN UNIVERSITY

EUROPEAN SCHOOL OF BUSINESS

Programs and data security
Educational program «Software engineering»

2024

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1	Name of the course and educational program

Programs and data security
Educational program "Software engineering"

2	Course description

In recent years, software security has become a major concern. As a result, integrating security into software development has become more difficult. Understanding the principles and techniques of software security helps developers identify and measure security at different stages of the software development life cycle, and as a result, leads to secure software. To create appropriate software, it is necessary to take early steps to assess security.

3	Study prerequisites

The program is arranged in accordance with the annotation of the educational and professional program for the training of bachelors, is based on the study of the disciplines "Physics (selected sections)", "Methods and means of information technology", "Architecture and design of software", "Computer architecture", precedes the study of the normative disciplines "Software design", "Empirical methods of software engineering". The knowledge obtained by higher education applicants during the study of the discipline "Security of programs and data" can be applied during industrial practice, preparation of qualification works in the specialty.

4	Amount of credits/hours

5 ECTS credits/ 150 hours

5	Training format

Blended learning

6	Classroom location

Room 405, https://dist.ieu.edu.ua/course/index.php?categoryid=649

7	Information about the teacher

Larysa Shevchuk Doctor of Pedagogical Sciences, Professor

8	Department

Department of Information Technologies

9	Office location

Kyiv, Akademika Glushkova Ave., 42 B, room 505

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10	Schedule of counseling

Every Tuesday from 12:00 to 16:00 with prior appointment via corporate mail

11	E-mail of the teacher

larisa_shevchuk@ieu.edu.ua

12	Course objectives

Students will gain an understanding of the ways in which changes in the structure of the social order occur under the influence of digital technologies and the possibilities for developing the concept of "digital citizenship", laying the foundation for the development of individual self-regulation in the Internet era. Moreover, this is not about narrowing, but about expanding the possibilities of a person who can and is ready to make a conscious and responsible choice (digital freedom of the individual)..

13	The role of academic discipline in achieving program results

PLO 4. Know and apply professional standards and other regulatory documents in the field of software engineering.
PLO 18. Know and be able to apply information technologies for processing, storing and transmitting data.
PLO 21. Know, analyze, select, and competently apply means of ensuring information security (including cybersecurity) and data integrity in accordance with the applied tasks being solved and the software systems being created

14	Learning outcomes

Know:
- basic provisions of legislation in the field of information protection, basic international and national data security standards;
- basic terms and definitions of security policy, principles of building an information protection profile to provide security services;
- attacker models, main types of attacks, principles of linear and differential cryptanalysis;
- mechanisms and protocols for key management in the information system.

Be able:
- apply modern block symmetric ciphers and encryption modes;
- analyze the crypto resistance of simple symmetric ciphers;
- explore modern asymmetric cryptosystems;
- analyze the security of personal confidential data based on secret disk and PGP secure email;
- conduct statistical research on random number generators and pseudorandom sequences according to the NIST method.

15	Course content

Content module 1. SECURITY AND PROTECTION OF PROGRAMS AND DATA
Topic 1. Basic concepts of program and data security. Basic principles of software protection
Topic 2. User identification and authentication. Network security analysis systems
Content module 2. BASICS OF BUILDING PROGRAM AND DATA PROTECTION SYSTEMS
Topic 3. Methods and means of restricting access to programs and data. Protection programs from unauthorized research
Topic 4. Cryptographic information protection. Virtual private networks

Content module 3. CRYPTOGRAPHIC PROTECTION OF PROGRAMS AND DATA

Topic 5. Encryption mechanisms. Symmetric and asymmetric cryptosystems

Topic 6. Fundamentals of public key technology (PKT)

Topic 7. Basics of digital shorthand

Topic 8. Fundamentals of cryptanalysis

Content module 4. SECURITY IN SOFTWARE

Topic 9. Basic principles of software protection. Software protection in Internet technologies

Topic 10. Protection of personal data

Topic 11. Comprehensive information protection systems.

16	Course materials and requirements

1. S. E. Ostapov, S. P. Yevseyev. O. G. Korol. Information protection technologies. Chernivtsi. Publishing house "Rodovid", 2014. 428 p

2. Information protection in automated control systems: a manual / Compiled by I.A. Pilkevych, N.M. Lobanchykova, K.V. Molodetska. Zhytomyr: Publishing house of I. Franko ZhDU, 2015. 226 p.

3. Litnarovych R.M. Modern technologies of information security. Textbook. MEGU, Rivne, 2011. 97 p.

4. O. O. Kuznetsov, S. P. Yevseyev, O. G. Korol. Information protection in information systems. Methods of traditional cryptography. Kharkiv: Publishing house of KhNEU, 2010. 316 p.

5. Information protection technologies in information and telecommunication systems: a manual / A. V. Zhilin, O. M. Shapoval, O. A. Uspensky; ISZZI Igor Sikorsky Kyiv Polytechnic Institute. Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, Publishing House "Polytechnics", 2021. 213 p.

6. Dudatiev A.V., Kaplun V.A., Semerenko V.P. D 81 Software protection. Part 1. Textbook. Vinnytsia: VNTU, 2005. 140 p.

7. Melnyk I. V. Information computer networks: Textbook for distance learning. Kyiv: University Publishing House "Ukraine", 2006. 250 p.

17	Technical requirements for working on the course

In order to access the course materials, you will need regular access to a computer and the Internet. In order to successfully study and pass the exam from the training course, it is necessary to constantly familiarize yourself with the materials posted on the university's remote platform (Moodle) in the course "Programs and Data Security". You also need to create reporting documents for the performance of practical work and upload them to the platform (the platform can only be used from a corporate email account).

In the case of problems with access to the distance learning platform, it is necessary to notify the dean's office or the headmaster, or the course teacher directly.

18	Learning process

The process of studying the course "Programs and Data Security" includes lectures and practical sessions. During the lectures, such teaching methods as lecture, lecture-conversation, and discussion, discussion of problematic issues, demonstration, and analysis of various situations will be used according to the topic of the lectures.

During practical classes, such teaching methods as surveys, testing, performance of individual tasks, performance of analytical and calculation works, solved specific problems and situations will be used).

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19	Signs of discipline

Term of teaching	Semester	International Disciplinary integration	Course study	Cycles: general training/ professional training/ free choice
1 semester	7th semester	No	4th year	Professional training course

20	Evaluation policies

You will have different ways to demonstrate your knowledge and skills throughout the semester. This includes how you attend class, how and what you contribute to topic discussions, how you complete and complete lab assignments and tests on time, how you complete independent work assignments, and the ability to present your work. In addition, it is possible to perform tasks that are performed individually or in a small group in the form of a student scientific work.

Activities during the semester	Maximum number of points during the semester
Current work (attendance, control during the lecture)	10
Laboratory work	36
Independent works	14
Together	**60**
Pass/Fail test	**40**
TOTAL	**100**

21	Rating scale

The grade for the discipline is defined as the sum of the points scored for the current activity in the semester. Each module includes an assessment score for the student's current work. Module control activities are carried out upon completion of the study of the taught material of this module. The minimum number of points for the current educational activity, which allows the discipline to be counted as completed, must be at least 60. The maximum point for the discipline is 100.

The total grade for studying the discipline is set according to the national and European scale (EKTS).

The overall final grade in points, according to the national scale and according to the ECTS scale, is entered in the student's assessment and examination information, study card and student's assessment book.

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Rating scale: national and ECTS

The sum of points for all types of educational activities	Evaluation ECTS	Evaluation on a national scale	
		for an exam, course project (work), practice	for credit
90-100	A	perfectly	Enrolled
82-89	B	good	
74-81	C	good	
66-73	D	satisfactorily	
60-65	E	satisfactorily	
30-59	FX	unsatisfactory with possibility reassembly	not counted with the possibility of retaking
1-29	F	unsatisfactory with mandatory repeated sstudy of the discipline	not enrolled with mandatory repeated study of the discipline

22	How to find out your score

To check your assignment grades and read the teacher's comments, you need to check the relevant tabs on the distance learning platform (Moodle) in this course.

You can also get information about the received grades in the joint chat of the subject group (Viber or Telegram) or directly from the course instructor via corporate mail, messengers or by appointment on the days of consultations.

23	Course policies

For the productive educational and cognitive activity of the applicants when studying the discipline, thematic lectures are held and practical classes are conducted in the form of laboratory works.

In classes and during his stay at the university, the student must treat teachers, staff and other students with respect, attend classes according to the schedule, come on time and not leave the classroom without the teacher's permission. It is necessary to complete all academic tasks and their work within the specified time. The teacher, in turn, must constantly raise his professional level, pedagogical skill, and general culture, provide conditions for students to master educational programs at the level of mandatory requirements for the content, level and scope of education, and promote comprehensive professional development of students. It is mandatory to follow the educational and thematic plan, not to be late for classes, not to allow any manifestations of corruption, discrimination, bullying, harassment and oppression of the rights of those seeking education. Education is based on the application of active learning methods. Active participation is expected and the norm. Attendance and active participation make up 80% of the grade. A student who, for good reasons, documented, was not subject to current control has the right to undergo current control within a two-week period after returning to studies. A student who was absent from classes without valid reasons, did not participate in current control activities, did not liquidate academic debt, is not allowed to take the final semester control of knowledge in this discipline, and on the day of the exam in the examination information by a scientific and pedagogical employee the grade "not admitted" is issued. Retaking the exam in the discipline is prescribed on the condition that all types of educational, independent (individual) work provided for in the work curriculum of the discipline are performed, and is carried out in accordance with the liquidation schedule approved by the directorate.

The academic integrity of any institution of higher education requires integrity in teaching and research, so academic integrity is required of all MEU students. Academic dishonesty is prohibited in all programs at our university. All participants in the educational process are guided by the principles of academic integrity.

24	Completing the task late, correcting grades, working out

Assignment reports must be uploaded to Moodle by the due dates specified in the course schedule. Best practice would be to complete assignments as soon as possible after receipt to allow enough time to actively participate in class. If more time is needed to complete the task, flexible deadlines are available. Completed assignments are accepted for full credit until the last class in the discipline on the schedule, after which 40% partial credit based on the grade received will be awarded within a week of the last day of class. Assignments that were not submitted at all will receive 0.

If classes are missed for more than one week due to illness or other reasons, it is necessary to contact the teacher to agree on alternative options for completing tasks. Deadlines work both ways, and meeting them ensures that your instructor provides timely feedback on your assignments to ensure you stay on course.

25	Teacher's response time (about checking assignments)

Via corporate mail (within 24 hours), via messengers (within 1-2 hours).

26	Effective communication

Effective communication is essential to success in this course, we recommend using the following channels:
Forum of questions and answers: for general course questions, you need to check the FAQ section in Moodle and then post your question in the Q&A forum to ask your colleagues or the instructor (guaranteed to receive a notification by e-mail every time a new publication or an answer to a question appears);
E-mail: have a personal question related to studying the course, write to the teacher directly;
Social networks, messengers: personal communication with classmates, teacher;
Face-to-face meeting: communication with classmates during classes and with the teacher on consultation days.

27	Policy of publication and distribution of course materials

Students may not post, publish, sell, or otherwise publicly distribute course materials without written Permission the teacher. Such materials include: lecture notes, slides (presentations) of lectures, video or audio recordings, tasks, problem sets, tests, other students' works and answers, etc. Students who sell, post, publish, or distribute course materials without written permission or otherwise may be subject to disciplinary action, up to and including withdrawal.
The use of generative AI is permitted subject to adherence to the principles of academic integrity.

28	Expected workload and involvement of students

Approximately 2-3 hours per week should be allocated to work in this course. If circumstances arise that force you to spend more time on one of the tasks, you must inform the teacher by e-mail (messenger).
An extension of the submission deadline is possible only under the condition that the teacher is informed in advance that it is impossible to submit the assignment by the specified time. Students are expected to have a backup plan in case of computer malfunctions or Internet outages.

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Electronic schedule: https://rozklad.ieu.edu.ua
Online library: https://onlinelibrary.ieu.edu.ua
Repository: https://sed.ieu.edu.ua/index.php/sed/index
Educational Ombudsman: https://ieu.edu.ua/pro-mieu/ombudsmen

| 30 | Course schedule |

Topic name	Content of practical class
Topic 1. Basic concepts of program and data security. Basic principles of software protection	▪ Control during the lecture; ▪ Tasks for independent work: Creating an explanatory dictionary ▪ Laboratory work No. 1. Logging actions users in software systems ▪ Tests
Topic 2. User identification and authentication. Network security analysis systems	▪ Control during the lecture; ▪ Tasks for independent work: Creating an explanatory dictionary ▪ Laboratory work No. 2. Development of a program for separating user authority based on password authentication ▪ Tests
Topic 3. Methods and means of restricting access to programs and data. Protection programs from unauthorized research	▪ Control during the lecture; ▪ Tasks for independent work: Creating an explanatory dictionary ▪ Laboratory work No. 3. Protection of web resources from bots and spam using the SARTSNA mechanism ▪ Tests.
Topic 4. Cryptographic information protection. Virtual private networks	▪ Control during the lecture; ▪ Tasks for independent work: Creating an explanatory dictionary ▪ Laboratory work No. 4. Formation of skills and abilities for implementing Blockchain ▪ Tests.
Topic 5. Encryption mechanisms. Symmetric and asymmetric cryptosystems	▪ Control during the lecture; ▪ Tasks for independent work: Creating an explanatory dictionary ▪ Laboratory work No. 5 Tools for creating virtual private networks ▪ Tests.
Topic 6. Fundamentals of public key technology (PKT).	▪ Control during the lecture; ▪ Tasks for independent work: Creating an explanatory dictionary ▪ Laboratory work No. 6. Using hash functions (for example, MD5), assessing the resistance of a password to hacking ▪ Tests.
Topic 7. Basics of digital shorthand	▪ Control during the lecture; ▪ Tasks for independent work: Creating an explanatory dictionary ▪ Laboratory work No. 7. Electronic digital signature using GnuPG as an example for protecting documents and e-mail ▪ Tests
Topic 8. Fundamentals of cryptanalysis	▪ Control during the lecture; ▪ Tasks for independent work: Creating an explanatory dictionary ▪ Laboratory work No. 8. Methods of hiding information in data streams ▪ Tests.

Topic 9. Basic principles of software protection. Software protection in Internet technologies	- Control during the lecture; - Tasks for independent work: Creating an explanatory dictionary - Laboratory work No. 9. Encryption algorithms and methods in computer systems - Tests
Topic 10. Protection of personal data	- Control during the lecture; - Tasks for independent work: Creating an explanatory dictionary - Laboratory work No. 10. Program and data protection tools; - Tests
Topic 11. Comprehensive information protection systems	- Control during the lecture; - Tasks for independent work: Creating an explanatory dictionary - Laboratory work No. 11. Development of an IT company's privacy policy in accordance with GDPR requirements - Laboratory work No. 12. Creating a DMZ for IT companies taking into account data security issues - Tests

31	Tips for successful study

The goal is unique to everyone, but its correct setting greatly affects the result, as well as the learning process. For example,
- processing the materials of the theoretical component (lectures) of the discipline will provide insight and knowledge about the
- development process and the architecture of the OS itself, and the implementation of the practical component - the acquisition
- of practical skills in the use of methods and tools for creating system software. After all, any training that follows a clear plan and
- with a serious attitude to the material will always be successful.
So, if you want to successfully master this subject, you must be:
- persistent, attentive and inquisitive;
- creative and cheerful, open to communication and discussions
- ready to receive information and knowledge on the subject not only during lectures, but also during extracurricular hours

See you soon!