MINISTRY OF HEALTH OF UKRAINE
KHARKIV NATIONAL MEDICAL UNIVERSITY

Department of Medical and Biological Physics and Medical Informatics
Academic year 2025-2026

SILLABUS
THE EDUCATIONAL DISCIPLINE

«EUROPEAN COMPUTER DRIVING LICENCE»

(title of the educational discipline)

Normative or selective educational discipline selective

Form of education full-time form of education
(full-time form of education; correspondence form of education; distance form of education)

Field of knowledge 22 «Health Care»
(code and title of the field of knowledge)

Specialty 221 «Dentistry»
(code and title of the specialty)

Educational and professional program (educational scientific program) «Dentistry»

Second (master's) level of higher education

Academic year: 2nd

The syllabus of the educational discipline was considered at the meeting of the Department of Medical and Biological Physics and Medical Informatics

Protocol No. 1
"26" August 2024

Head of the Department

prof. O.V. Zaytseva

Approved by the Methodological Committee of KhNMU on Problems of general and natural science training

Protocol No.1
"30" August 2024

Head

prof. M.S. Myroshnychenko

SYLLABUS DEVELOPERS:

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INFORMATION ABOUT TEACHERS TEACHING THE EDUCATIONAL COMPONENT

Last Name, First Name, Patronymic, Position, Academic Title, Academic Degree	Yevheniia Borysivna Radzishevska, Associate Professor at HEI, Associate Professor, PhD in Physics and Mathematics
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Consultation Hours	According to the academic schedule
Location	Department of Medical and Biological Physics and Medical Informatics
Last Name, First Name, Patronymic, Position, Academic Title, Academic Degree	Andrii Serhiiovych Solodovnikov, Associate Professor at HEI, Associate Professor, PhD in Technical Sciences
Professional Interests, Link to Instructor Profile (on the university website, department site, in Moodle system, etc.)	Logic. Formal Logic; Medical Informatics https://knmu.edu.ua/departments/kafedra-medychnoyi-ta-biologichnoyi-fizyky-i-medychnoyi-informatyky/
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Consultation Hours	According to the academic schedule
Location	Department of Medical and Biological Physics and Medical Informatics

PREFACE

The syllabus of the educational component "European computer driving license" has been developed in accordance with the Educational and Professional Program (hereinafter – EPP) "Dentistry" and the Standard of Higher Education of Ukraine (hereinafter – the Standard), second (master's) level of higher education, field of knowledge 22 "Health Care", specialty 221 "Dentistry."

Description of the educational component "European computer driving license" (annotation). The educational component **"European computer driving license"** is taught with the aim of familiarizing higher education students with the patterns and principles of implementing information processes in systems of different hierarchical levels within the health care sector. It examines decision support systems in medicine; information technologies for analysis, modeling, forecasting, and management in the field of biomedical research; and elements of the theory of medical information systems.

The **subject of study** of this educational component is information processes in the field of health care in the context of the development of the electronic health care system.

Interdisciplinary connections: with such educational components as "Medical Informatics", "Medical Biology", "Medical and Bioorganic Chemistry", "Medical and Biological Physics", and "Modern Problems of Biophysics".

Prerequisites. Studying this elective educational component presupposes prior completion of the following educational components: "Medical Biology," "Medical and Bioorganic Chemistry," and "Medical and Biological Physics."

Postrequisites. The main provisions of this elective educational component should be applied in the study of specialized (professional) educational components.

Link to the page of the elective educational component "EUROPEAN COMPUTER DRIVING LICENSE" in MOODLE.

https://distance.knmu.edu.ua/course/view.php?id=6385

1. THE PURPOSE AND OBJECTIVE OF THE EDUCATIONAL COMPONENT

1.1. The purpose of teaching the educational component "European computer driving license" is to form and develop students' competencies in the field of digital technologies in order to ensure the rational use of modern general-purpose and specialized software in the processing of biomedical data, as well as to study the patterns and principles of information processes in systems of different hierarchical levels within the health care sector.

1.2. The main objectives of the educational component "European computer driving license**"** are the acquisition by students of competencies (general and professional) defined in the Educational and Professional Program "Dentistry" at the second (master's) level of higher education in the specialty 221 "Dentistry."

1.3. Competencies and learning outcomes, the formation of which is facilitated by this educational component (interrelation with the normative content of training of higher education students formulated in terms of learning outcomes in the EPP and the Standard):

1.3.1. The study of the educational component **"**European computer driving license**"** ensures that students acquire the following competencies:

- Integral competence: The ability to solve complex tasks and problems in the field of health care in the specialty **"Dentistry"** in professional practice or in the learning process, which involves conducting research and/or implementing innovations and is characterized by uncertainty of conditions and requirements.

General Competencies (GC):

GC 1. Ability for abstract thinking, analysis, and synthesis.
GC 2. Knowledge and understanding of the subject area and understanding of professional activity.
GC 3. Ability to apply knowledge in practical activities.
GC 4. Ability to communicate in the state language both orally and in writing.
GC 6. Skills in the use of information and communication technologies.
GC 7. Ability to search, process, and analyze information from various sources.
GC 8. Ability to adapt and act in new situations.
GC 9. Ability to identify, formulate, and solve problems.
GC 10. Ability to be critical and self-critical.
GC 11. Ability to work in a team.
GC 12. Commitment to environmental preservation.
GC 13. Ability to act in a socially responsible and conscious manner.
GC 14. Ability to exercise one's rights and responsibilities as a member of society, to understand the values of a civil (free democratic) society and the need for its sustainable

development, the rule of law, and the rights and freedoms of humans and citizens in Ukraine.

GC 15. Ability to preserve and enhance the moral, cultural, and scientific values and achievements of society based on an understanding of the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, engineering, and technologies; as well as to use various types and forms of physical activity for active recreation and maintaining a healthy lifestyle.

Special (Professional) Competencies (SC):

SC 13. Ability to assess the impact of the environment on the health status of the population (individual, family, and population levels).

SC 15. Processing of governmental, social, and medical information.

SC 17. Ability to ensure the legal support of one's professional activities.

1.3.2. The study of the educational component ensures that students acquire the following Program Learning Outcomes (PLO):

PLO 14. Analyze and evaluate governmental, social, and medical information using standard approaches and computer information technologies.

PLO 16. Formulate goals and determine the structure of personal activities based on the results of analyzing certain social and personal needs.

PLO 17. Adhere to a healthy lifestyle and use techniques of self-regulation and self-control.

PLO 18. Be aware of and guided in one's activities by civil rights, freedoms, and responsibilities, and improve the general educational and cultural level.

PLO 19. Comply with the requirements of ethics, bioethics, and deontology in professional activities.

1.3.3. The study of this educational component ensures that students acquire the following social skills (Soft skills):

1. Communication skills (implemented through: group work methods and brainstorming during the analysis of clinical cases, as well as presentation of the results of independent work and their defense within the group).
2. Teamwork (implemented through: group work methods and brainstorming during the analysis of clinical cases).
3. Conflict management (implemented through: business games/role-playing activities).
4. Time management (implemented through: self-organization during in-class group work and independent study).
5. Leadership skills (implemented through: presentation of the results of independent work and their defense within the group).

2. INFORMATIONAL SCOPE OF THE EDUCATIONAL COMPONENT "EUROPEAN COMPUTER DRIVING LICENSE"

<table>
<tr><td rowspan="2">Name of indicators</td><td rowspan="2">Field of knowledge, specialty, educational degree</td><td>Characteristics of the educational component</td></tr>
<tr><td>full-time education</td></tr>
<tr><td>Number of credits – 3,0</td><td>Field of knowledge:
22 "Health care"
(the code and name)</td><td>Elective discipline</td></tr>
<tr><td rowspan="5">Total number of hours - 90</td><td rowspan="5">Specialty:
221 «Dentistry»
(the code and name of specialization)</td><td>Year of preparation (course):</td></tr>
<tr><td>2-й</td></tr>
<tr><td>Semester</td></tr>
<tr><td>-/- , -/-</td></tr>
<tr><td>Lecture</td></tr>
<tr><td rowspan="9">Hours for day (or evening) form of study:
classrooms 30 hours
independent student work 60 hours</td><td rowspan="9">Educational degree: 2-nd (master) degree

EPP:
"Dentistry"</td><td>0 h.</td></tr>
<tr><td>Practical classes</td></tr>
<tr><td>30 h.</td></tr>
<tr><td>Laboratory work</td></tr>
<tr><td>0 h.</td></tr>
<tr><td>Independent work</td></tr>
<tr><td>60 h.</td></tr>
<tr><td>Individual tasks: 0 h.</td></tr>
<tr><td>Type of control: credit</td></tr>
</table>

2.1 Description of the discipline

2.1.1 Lectures

Not included in the curriculum.

2.1.2 Seminar classes

Not included in the curriculum

2.1.3 Practical classes

№ з/п	Topics name	Hours	Education methods	Type of control
1	Basic Concepts of Informatics. The Computer in a Physician's Professional Activity	4		
2	Text Editors for Creating and Editing Text	2		

	Documents		Presentation on the platform Google meet, explanation, conversation	test control (Moodle platform)
3	Data Processing Technologies in Spreadsheet Software	4		
4	Database Management Systems for Data Organization, Storage, and Access	4		
5	Multimedia Programs for Preparing Presentations	2		
6	Internet Information Resources	2		
7	Coding, Classification, and Algorithmization of Medical Tasks	4		
8	Fundamentals of Information Security. Protection of Medical Information	6		
9	Final Assessment. Pass/Fail Credit	2	test control (Moodle platform)	
	Total Hours	**30**		

2.1.4. Laboratory work

Not included in the curriculum

2.1.5. Independed work

№ з/п	Topic	Hours	Education methods	Type of control
1	History of the Development of Informatics and Information Technologies	4	electronic informational	test control as a component of final control (Moodle platform)
2	Cybernetics and the History of Its Development	4		
3	Comparative Analysis of Operating Systems (Windows, Linux, Android, etc.)	4		
4	Problems of Information Protection in the Implementation of Network Technologies	4		
5	Life Cycle of Information Systems	4		
6	Types of Support for Information Systems (information, legal,	4		

	mathematical, software, etc.)			
7	Simulation and Mathematical Modeling in Biology and Medicine	4		
8	Expert Systems in Medicine as Specialized Software	4		
9	OSI Network Model	4		
10	Network Data Transmission Protocols	4		
11	Types of Database Organization	2		
12	General Principles of Database Development	4		
13	Data Schemas in Databases	2		
14	Image Encoding	2		
15	Information Compression Standards	6		
16	Capabilities of Multimedia Technologies in Information Presentation	4		
	Total Hours	**60**		

2. ASSESSMENT CRITERIA FOR THE ELECTIVE EDUCATIONAL COMPONENT "EUROPEAN COMPUTER DRIVING LICENSE"

3.1.1 The assessment of students' academic performance is carried out in accordance with the current "Instruction on the Assessment of Educational Activities of KhNMU Students"

Assessment methods: Oral and written assessment of topic comprehension is conducted during practical classes.

Assessment of the acquisition of practical skills and abilities is conducted during practical classes through observation.

Assessment of independent work is conducted in written and oral forms (the written form involves submission both in paper and/or electronic format).

Current assessment is carried out at every practical class according to the specific objectives of the topic. In addition, all practical classes include standardized forms of control of theoretical knowledge and assessment of practical skills acquisition: computer-based tests on the MOODLE distance learning platform and completion of practical tasks, including competency-oriented tasks.

Final assessment involves the use of computer-based tests on the MOODLE distance learning platform to verify the level of theoretical knowledge and the development of practical skills of students while completing a practical task on a computer.

The grade for each practical class within the educational component is comprehensive and includes assessment of both theoretical and practical preparation of the higher education student. It is assigned by the instructor according to the traditional four-point grading scale in the automated management system (AMS), after which it is converted into the corresponding points.

Criteria for evaluating the final assessment on the MOODLE distance learning platform:

The final test contains 25 questions, including:

15–19 correct answers – 15–19 points – grade "3"
20–23 correct answers – 20–23 points – grade "4"
24–25 correct answers – 24–25 points – grade "5"

Assessment of the current educational component (CEC):

After the last practical class is conducted and the grade is entered into the electronic journal, the AMS calculates the student's average grade for the semester. If there is no academic debt or missed classes, the student receives a pass.

The conversion of the average grade for current academic activity into the multi-point scale is carried out in the AMS in accordance with the "Instruction on the Assessment of Educational Activities of KhNMU Students," approved by KhNMU Order No. 181 dated August 21, 2021 (Table 1).

Table 1

Recalculation of the average score for the current activity into a multi-scale (for subjects completed by credit)

4- markscale	200- mark scale	4- mark scale	200- mark scale	4- mark scale	200- markscale
5	200	4.3-4,31	172	3.6-3,61	144
4.97-4,99	199	4,27-4,29	171	3.57-3,59	143
4.95-4,96	198	4.24-4,26	170	3.55-3,56	142
4.92-4,94	197	4.22-4,23	169	3.52-3,54	141
4.9-4,91	196	4.19-4,21	168	3.5-3,51	140
4.87-4,89	195	4.17-4,18	167	3.47-3,49	139
4.85-4,86	194	4.14-4,16	166	3.45-3,46	138
4.82-4,84	193	4.12-4,13	165	3.42-3,44	137
4.8-4,81	192	4.09-4,11	164	3.4-3,41	136
4.77-4,79	191	4.07-4,08	163	3.37-3,39	135
4.75-4,76	190	4.04-4,06	162	3.35-3,36	134
4.72-4,74	189	4.02-4,03	161	3.32-3,34	133
4.7-4,71	188	3.99-4,01	160	3.3-3,31	132
4.67-4,69	187	3.97-3,98	159	3.27-3,29	131
4.65-4,66	186	3.94-3,96	158	3.25-3,26	130

4.62-4,64	185		3.92-3,93	157		3.22-3,24	129
4.6-4,61	184		3.89-3,91	156		3.2-3,21	128
4.57-4,59	183		3.87-3,88	155		3.17-3,19	127
4.54-4,56	182		3.84-3,86	154		3.15-3,16	126
4.52-4,53	181		3.82-3,83	153		3.12-3,14	125
4.5-4,51	180		3.79-3,81	152		3.1-3,11	124
4.47-4,49	179		3.77-3,78	151		3.07-3,09	123
4.45-4,46	178		3.74-3,76	150		3.05-3,06	122
4.42-4,44	177		3.72-3,73	149		3.02-3,04	121
4.4-4,41	176		3.7-3,71	148		3-3,01	120
4.37-4,39	175		3.67-3,69	147		**Less than 3**	**Not enough**
4.35-4,36	174		3.65-3,66	146			
4.32-4,34	173		3.62-3,64	145			

3.1.2. Grade for the educational component “Medical Informatics”.

The grade is determined by the points obtained for CEC and ranges from 120 to 200 points. The correspondence of grades on the 200-point scale to the ECTS grading scale and the four-point grading scale is presented in Table 2.

Table 2

Correspondence of scores on the 200-point scale to the ECTS scaleand to the four-point (national) scale

200 - point scale	ECTS grading scale	four-point grading scale
180–200	A	Excellent
160–179	B	Good
150–159	C	Good
130–149	D	Satisfactory
120–129	E	Satisfactory
Less than 120	F, Fx	Unsatisfactory

A student receives the mark "Pass" in the grade book if they obtain from 120 to 200 points.

3.2. Questions for the Pass/Fail Credit

Not provided for in the curriculum.

3.3. Questions for the Final Assessment

1. Definition of ECDL (EUROPEAN COMPUTER DRIVING LICENSE) as a discipline.
2. Concepts of "information message", "data", "signal", and "communication channel".
3. Measurement of the amount of information.

4. Structure of a personal computer.
5. Personal computer software. Classification of software.
6. Operating systems and their classification.
7. Main components of computer networks. Basic communication model.
8. Classification of computer networks.
9. Addressing on the Internet: IP address, domain name (DNS address), URL address.
10. Use of Internet services.
11. Principles of forming a search query. Types of search.
12. General-purpose search engines.
13. Specialized medical search engines.
14. Medical Internet resources.
15. Concept of the semantic triangle.
16. Definition of classification and its examples.
17. Types of codes: numeric, mnemonic, hierarchical, matching codes.
18. Coding systems: ICD, DSM, SNOMED, ICPC.
19. Definition of formalization and algorithmization.
20. Types of algorithms: linear, branching, cyclic.
21. Centralized and distributed databases; hierarchical and network databases; specialized databases.
22. Current situation in the field of information security.
23. Categories of information security: confidentiality, integrity, secrecy, protection, authenticity, non-repudiation, reliability, accuracy, controllability, and identification control.
24. Protection of medical information; levels of protection of patient information.
25. Characteristics that affect information security.
26. Problems of protecting medical confidentiality.
27. Classification of information security violations.
28. Modeling processes for creating information protection systems.
29. Workbook in MS Excel and its structure.
30. Error values in MS Excel.
31. Creating charts (graphs) in MS Excel.
32. Use of MS Excel in medicine.
33. Use of MS Excel for statistical data processing.
34. Expert systems as a class of artificial intelligence systems. Specific features of implementing expert systems based on formal and informal logic.
35. Main criteria for the feasibility of creating expert systems.
36. Structure of a typical expert system.
37. Characteristic features of expert systems (field of use, design features, problem-solving methods, etc.).
38. Inference engine. Forward and backward reasoning.
39. Tools for expert systems.

40. Knowledge base of an expert system: static, dynamic, and working knowledge. Sources of knowledge for expert systems. Methods of acquiring knowledge by the system.
41. Main knowledge representation models: production rules, frames, semantic networks, logical models, neural networks.
42. Use of expert systems in medicine.
43. Expert systems as a class of artificial intelligence systems. Specific features of implementing expert systems based on formal and informal logic. Criteria for the necessity of creating expert systems.
44. Types of modeling; degrees of complexity and adequacy of a mathematical model.
45. Limitations and advantages of the mathematical modeling method.
46. Predator–prey model.
47. Description of the immunological model.
48. Description of the infectious disease spread model.
49. Multimedia technologies, categories of multimedia products, capabilities of multimedia technologies.
50. Multimedia in medicine; the multimedia program LibreOffice Impress.

3.4. Individual Assignments

Not provided for in the curriculum.

3.5 Rules for Appealing a Grade

If a student disagrees with the grade received during a class, they may appeal it. In this case, the student's knowledge will be evaluated by a commission consisting of the head of the department or the deputy head for academic affairs, an independent instructor, and the instructor of the group in which the student studies.

4. EDUCATIONAL COMPONENT POLICY

For the successful completion of the educational component, the student must systematically prepare for practical classes, complete the tasks proposed for mastering the topics recommended for independent study, read the recommended literature, and actively participate in the discussion of the class topic in the classroom / online.

Attendance at practical classes is mandatory (except for valid reasons). A class missed for any reason must be made up. Being late for classes is unacceptable. When communicating with the instructor and others, the student must be polite, speak quietly, and behave calmly.

5. ACADEMIC INTEGRITY

Observance of academic integrity by the student involves the independent completion of educational tasks, proper citation of information sources when using ideas, statements, or data, compliance with copyright legislation, and providing reliable information about the results of one's own educational (scientific, creative) activities.

Violations of academic integrity include plagiarism, cheating, deception, falsification, etc. For violations of academic integrity, a student may be subject to the following sanctions:

-re-taking the assessment (graded credit);

-re-taking the entire course of the compulsory educational component;

-expulsion from the higher education institution (HEI).

6. Recommended literature

Basic

1. Radzishevska Ye. B., Vysotska O. V. Medical Information Systems: Global Experience: a textbook for students of higher medical education. Kharkiv: KhNMU, 2024. 100 p.
2. E.H. Shortiffe. Biomedical Informatics: Computer Applications in Health Care and Biomedicine 4-th edition / Edward H. Shortiffe, James J. Cimino // New York: Springer. – 1037 p. 2022 p.
3. Kiel J.M., Kim G.R., Ball M.J. Healthcare Information Management Systems. Publisher Springer Cham. 2022. - 490 p.
4. Winter A., Ammenwerth E., Haux R., Marschollek M., Steiner B., Jahn F. Health Information Systems. Publisher Springer Cham. 2023. - 259 p.
5. Dr. Loh: Telemedicine help needed for Ukraine refugees [Електронний курс] – URL: https://eu.vestar.com/story/opinion/columnists/2022/03/25dz.-loh-telemedicine-help-needed-ukraine-refugees/7155781001/
6. T. Turytska. Information Technologies in Medicine. Methodological Guidelines. Oles Honchar Dnipro National University. – 2021.

Supplementary

1. Purpose and capabilities of administrative medical information systems in the modern digital medical environment / Ye. B. Radzishevska, L. V. Batiuk, M. V. Chupryna, A. S. Rudiuk // World of Scientific Research. Issue 23: Proceedings of the International Multidisciplinary Scientific Internet Conference (Ternopil, Ukraine; Opole, Poland, October 24–25, 2023) / edited by O. Patriak et al. NGO “Scientific Community”, WSZIA in Opole. Ternopil: FOP Shpak V.B., 2023. 294 p., pp. 223–230.

2. Patient administration systems as a component of administrative medical information systems / Ye. B. Radzishevska, L. V. Batiuk, M. V. Chupryna, A. S. Rudiuk // World of Scientific Research. Issue 23: Proceedings of the International Multidisciplinary Scientific Internet Conference (Ternopil, Ukraine; Opole, Poland, October 24–25, 2023) / edited by O. Patriak et al. NGO “Scientific Community”, WSZIA in Opole. Ternopil: FOP Shpak V.B., 2023. 294 p., pp. 230–232.

3. Ministry of Health of Ukraine. Concept of Healthcare Informatization. – 2020. – Available at:
[http://moz.gov.ua/article/reformplan/jak-bude-rozvivatisja-enealth-v-ukraini-prezentuvali-proekt-koncepciiinformatizacii-ohoroni-zdorovja](http://moz.gov.ua/article/reformplan/jak-bude-rozvivatisja-enealth-v-ukraini-prezentuvali-proekt-koncepciiinformatizacii-ohoroni-

zdorovja).

4. Electronic Healthcare System / Yevheniia Borysivna Radzishevska; Lidiia Vadymivna Batiuk; Mariia Valeriivna Chupryna // Modern Problems of Science, Education and Society. Proceedings of the II International Scientific and Practical Conference, Kyiv, Ukraine, April 24–26, 2023. pp. 204–211.

5. Bondarenko M.A., Zaitseva O.V., Radzishevska Ye.B., Solodovnikov A.S., Ponomarenko N.S. Current issues of digital transformation of education for future physicians at Kharkiv National Medical University. / I International Scientific Conference "Theory of Modernization in the Context of Modern World Science", June 23, 2023. Poltava, Ukraine. 2023. pp. 224–226.
https://doi.org/10.36074/mcnd-23.06.2023
https://distance.knmu.edu.ua/course/view.php?id=6385

8. OTHER

Regulations on the prevention, deterrence, and resolution of cases related to sexual harassment and discrimination at KhNMU
https://knmu.edu.ua/wp-content/uploads/2021/05/polog_sex.pdf

Regulations on academic integrity and ethics of academic relations at Kharkiv National Medical University
https://knmu.edu.ua/wp-content/uploads/2021/05/polog_ad-1.pdf

Procedure for conducting classes for in-depth study by students of Kharkiv National Medical University of individual disciplines beyond the curriculum
https://knmu.edu.ua/wp-content/uploads/2021/05/poriad_pogl-vyv_dysc.pdf

Regulations on the Commission on Academic Integrity, Ethics, and Conflict Management at KhNMU
https://knmu.edu.ua/wp-content/uploads/2021/05/polog_komis_ad.pdf

Regulations on the recognition of the results of non-formal education at Kharkiv National Medical University
https://knmu.edu.ua/wp-content/uploads/2021/05/polog_neform_osv22.pdf

INCLUSIVE EDUCATION

https://knmu.edu.ua/wp-content/uploads/2021/12/proekt_polog_inkl_navch.pdf

ACADEMIC INTEGRITY

https://knmu.edu.ua/akademichna-dobrochesnist/

https://knmu.edu.ua/wp-content/uploads/2021/05/polog_ad-1.pdf