

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ
ІМЕНІ СЕМЕНА КУЗНЕЦЯ

ЗАТВЕРДЖЕНО

на засіданні кафедри
інформаційних систем.
Протокол № 1 від 22.08.2023 р.

ПОГОДЖЕНО

Проректор з навчально-методичної роботи



Каріна НЕМАШКАЛО

ПРОЕКТУВАННЯ ІНТЕРФЕЙСУ ПРОГРАМНИХ СИСТЕМ

робоча програма навчальної дисципліни (РПНД)

Галузь знань 12 "Інформаційні технології"
Спеціальність 121 "Інженерія програмного забезпечення "
Освітній рівень перший (бакалаврський)
Освітня програма "Інженерія програмного забезпечення"

Статус дисципліни обов'язкова
Мова викладання, навчання та оцінювання англійська

Розробник:
д.п.н, професор

підписано КЕП

Людмила ГРИЗУН

Завідувач кафедри
інформаційних систем

Дмитро БОНДАРЕНКО

Гарант програми

Олег ФРОЛОВ

Харків
2024

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS**

APPROVED

at the meeting of the department
information systems
Protocol № 1 of 22.08.2023



AGREED

Vice-rector for educational and methodical work

Karina NEMASHKALO

DESIGN OF PROGRAM SYSTEMS INTERFACE

Program of the course

Field of knowledge	12 "Information Technology"
Specialty	121 "Software engineering"
Study cycle	first (bachelor)
Study programme	"Software Engineering"

Course status	mandatory
Language	English

Developers:
Doctor (Pedagogical sciences),
Professor

digital signature

Liudmyla GRYZUN

Head of Information systems
department:
Ph.D. (Technical sciences),
associate professor


Dmytro BONDARENKO

Head of Study Programme:
Ph.D. (Technical sciences),
associate professor


Oleg FROLOV

**Kharkiv
2024**

INTRODUCTION

The course "Designing the program systems interface" is one of the mandatory profiling courses and therefore occupies a leading place in the training of bachelors in the Software Engineering specialty.

The course is aimed at forming students' knowledge and understanding of the psychological, sociological and technological foundations of prototyping and designing the interface of software systems.

The purpose of studying the course is to acquaint students with the paradigms of designing high-quality user interfaces; to provide knowledge on the design of software system interfaces, necessary for further practical activities; to acquaint the students with the theoretical basis and develop the students' ability to use the acquired knowledge when designing the interfaces of the developed software; to prepare students for designing user interfaces in complex and unpredictable conditions, which requires the use of new approaches and the generation of new ideas (creativity), independent search for errors, evaluation of one's behavior and thinking results, and constant self-improvement.

The task of the course is to form students' systematized idea about the concepts of interface design and awareness of the place of this stage in the general process of designing information systems, methods and tools for building a prototype, as well as obtaining practical skills in creating an interface, necessary for the effective design of modern information systems.

The object of the course is the regularities of designing the interface of information systems.

The subject of the course is the theoretical concepts of modern trends in the design of software interfaces, as well as the use of various tools for its development.

The learning outcomes and competencies formed by the course are defined in the table. 1.

Table 1

Learning outcomes and competencies formed by the course

Learning outcomes	Competencies
LO 08	GC 05, GC 06, SC 10, SC 13, SC 14
LO 09	GC 03, SC 04
LO 12	SC 01, SC 02, SC 14
LO 14	CK 04, CK 05, CK 13
LO 20	SC 04, SC 09

where, LO 08. Be able to develop a human-machine interface.

LO 09. Know and be able to use methods and means of selecting, formulating and analyzing software requirements.

LO 12. Apply effective software design approaches in practice.

LO 14. Apply in practice instrumental software tools for domain analysis, design, testing, visualization, measurement and documentation of software.

LO 20. Know approaches to software quality assessment and assurance.

GC 03. Ability to communicate in the state language both orally and in writing.

GC 05. Ability to learn and master state of the art knowledge.

GC 06. Ability to search, process and analyze information from various sources.

SC 01. Ability to identify, classify and formulate software requirements.

SC 02. Ability to participate in software design, including modeling (formal description) of its structure, behavior and functioning processes.

SC 04. The ability to formulate and ensure software quality requirements in accordance with customer requirements, specifications and status.

SC 05. Ability to follow specifications, standards, rules and recommendations in the professional field when implementing life cycle processes.

SC 09. Ability to evaluate and take into account economic, social, technological and environmental factors affecting the field of professional activity.

SC 10. The ability to accumulate, process and systematize professional knowledge regarding the creation and maintenance of software and the recognition of the importance of lifelong learning.

SC 13. The ability to reasonably choose and master software development and maintenance tools.

SC 14. Ability to algorithmic and logical thinking.

COURSE CONTENT

Content module 1. Basics of software system interface design.

Topic 1. User interface (UI). Basic concepts and design problems.

The purpose and tasks of the course, its place in the educational process. The structure of the course, recommendations for its study. Organizational and methodological support of the course. Principles of user-oriented UI design.

Topic 2. Styles, models, methods and means of UI design and development.

User interface styles, "friendly" user interface. User interface models. Stages, methods and means of user interface development.

UI developer's toolkit. Figma as a modern working environment of interface design and prototyping. The main tools for developing a static IC prototype. Use of color in UI design.

Features of using sound and animation in UI design to improve user experience.

Topic 3. Psychological and sociological principles of UI design.

Human factors, ergonomics, psychology and sociology in the design of user interfaces. User interface design rules.

Methods of visualization of the user interface during design. Object-oriented user interface (OOUI).

Content module 2. Technological basics of software system interface design

Topic 4. Principles and stages of UI design.

Stages of user interface design. Iterative nature of design. Collective approach. Connection of the UI development and implementation stage with other general stages of designing software systems.

Planning work on the design and development of user interfaces. A user-oriented interface design plan.

Iterative processes and plan-graphs.

Topic 5. Conceptual design of UI.

Requirements, standards, principles and guidelines in the design of user interfaces. Concepts of UX and UI design, their tasks, differences and relationships. Comparative analysis of existing UX/UI designer tools.

Topic 6. Problems of web application interface design.

Features of designing IR web applications.

Concept of landing. The role of UX and UI design for the development of an effective landing page. UI elements as a means of increasing site conversion.

Topic 7. Designing the design of the mobile version of the site.

Adaptive design. Problems and features of adaptive design.

Topic 8. User interface testing.

Electronic support and modern information technologies for UI testing. Application of eye-tracking technology for the study of human-machine interaction.

The list of laboratory studies in the course is given in table 2.

Table 2

The list of laboratory studies

Topics	Зміст
Topic 1. Laboratory study 1.	Getting to know the Figma UI design environment
Topic 2. Laboratory study 2.	Prototyping tools in Figma interface design environment
Topic 3. Laboratory study 3.	Facilities of the Figma environment for work with frames, grids, components as elements of the user interface
Topic 4. Laboratory study 4.	Using Figma facilities to align, work with primitives, and export graphic images as UI elements
Topic 6. Laboratory study 5.	Web application interface design. Mini-project on an individual task.
Topic 7. Laboratory study 6.	Design of the interface of the mobile version of the site. Mini-project on an individual task.

The list of self-studies topics in the course is given in table 3.

Table 3

List of self-studies topics

Topic	Content
Topic 1.	Processing of lecture material. History (development evolution) of the user interface. Modern trends in UI design. Preparation for the laboratory session.
Topic 2.	Processing of lecture material. The role of color and typography in UI design: psychological, marketing and other aspects. UI design environments (Figma, Sketch, Photoshop): comparative characteristics. Preparation for laboratory classes.
Topic 3.	Processing of lecture material. Methods of visualization of the user interface during design. Animation in UI as a mean of improving the user

	experience. Preparation for laboratory classes.
Topic 4.	Processing of lecture material. UI design as an integral part of software design, its place among other stages of design. Preparation for laboratory classes.
Topic 5.	Processing of lecture material. The profession of UX/UI designer: tasks, skills and perspectives. Problems of interface design for users with special needs. Preparation for laboratory classes.
Topic 6.	Processing of lecture material. UI as a marketing factor: techniques of promoting software and manipulating the user (his needs). Preparation for laboratory classes. Development of individual projects.
Topic 7.	Processing of lecture material. Problems and features of adaptive design. Preparation for laboratory classes. Development of individual projects.
Topic 8.	Processing of lecture material. Eye-tracking technology for the study of human-machine interaction. Using the concept of Universal design for the development of inclusive software tools. Preparation for laboratory classes. Development of individual projects.

The number of hours of lecture and laboratory studies and hours of self-study is given in the technological card of the course.

TEACHING METHODS

In the process of teaching the course, in order to acquire certain learning outcomes, to activate the educational process, it is suggested using the following teaching methods:

Verbal (lecture (Topic 1, 2), problem-based lecture (Topic 3 - 8)).

Visual (demonstration (Topic 1 - 8)).

Practical (laboratory work (Topic 6-8)).

Mini-conference with discussion of current problems of the course and defense of individual projects (Topic 6-8).

FORMS AND METHODS OF ASSESSMENT

The University uses a 100-point cumulative system for assessing the learning outcomes of students.

Current control is carried out during lectures, laboratory classes and is aimed at checking the level of readiness of the student to perform a specific job and is evaluated by the amount of points scored:

– for courses with a form of semester control as an exam: maximum amount is 60 points; minimum amount required is 35 points.

The final control includes current control and an exam.

Semester control is carried out in the form of a semester exam.

The final grade in the course is determined:

– for courses with a form of exam, the final grade is the amount of all points received during the current control and the exam grade.

During the teaching of the course, the following control measures are used:

Current control:
defense of laboratory work (50 points);
defense of individual project (10 points).
Semester control: Grading including Exam (40 points)

An example of an examination card

Simon Kuznets Kharkiv National University of Economics
First (bachelor) level of higher education
Specialty "Software Engineering"
Study program "Software engineering"
Semester 5
Course "Design of program systems interface"

EXAM CARD

Task 1. Highlight the main concepts, components and problems of user interface (UI) design.
Task 2. Characterize the design features of the user interface of the mobile version of the site.
Give examples.

Protocol No. ____ dated " ____ " _____ 20 ____ was approved at the meeting of the Department of Information Systems

Examiner
Chief department

Doc.Ped.Sciences, Professor Gryzun L.
PhD, Associate Professor Bondarenko D.

Assessment criteria

The final points for the exam consist of the sum of the points for the completion of all tasks, rounded to a whole number according to the rules of mathematics.

The exam card consists of two tasks to test students' knowledge of the basics of UX/UI design and their ability to implement the knowledge in practically-driven tasks.

The structure of the examination card is built according to the following example.

1. Give a detailed answer to the theoretical question.
2. Give a comprehensive answer to a practically-oriented question about tools and specific stages of user interface design..

The duration of the exam is 90 minutes, while the estimated time for preparing answers to individual questions is as follows: task 1 – 45 minutes, task 2 – 45 minutes.

The answer to the theoretical question should be clear and detailed, with relevant practical examples.

The solution to the problem must contain an explanation of the used algorithm (its description), the features of its application, an analysis of its complexity, etc.; program code; a screenshot with the code and test results of the program; analysis of results; conclusions.

The evaluation of the exam result is formed according to the following rule. Each task of the examination card is evaluated for a maximum of 20 points. The number of points obtained from the answers to each task of the examination card is summed up.

20-18 points - awarded for in-depth knowledge of the educational material of the course contained in the main and additional recommended literary sources, the ability to analyze the issues of UX/UI design, in their relationship and development, to give apt examples, to answer clearly,

succinctly, logically and consistently to the questions asked, the ability to apply theoretical provisions when solving practical problems;

17-15 points - awarded for solid knowledge of the educational material of the course, including calculations, reasoned answers to the questions, giving apt examples, the ability to apply theoretical provisions when solving practical problems;

14-11 points - awarded for solid knowledge of the educational material of the course, including giving examples, reasoned answers to the questions, which, however, contain insignificant inaccuracies, for the ability to apply theoretical provisions when solving practical problems;

10-8 points are awarded for sufficient knowledge of the educational material of the course, answers to the questions and solving the problem, which, however, contain certain inaccuracies;

7-5 points - awarded for mediocre knowledge of the educational material of the course, poorly reasoned answers, mediocre application of theoretical provisions when solving practical problems, but there is significant progress in solving practical problems;

4-2 points - awarded for weak knowledge of the educational material, inaccurate or poorly reasoned answers, with a violation of the sequence of its presentation for weak application of theoretical provisions when solving practical problems;

1-0 points - awarded for ignorance of a significant part of the educational material, significant mistakes in answering questions, inability to apply theoretical provisions when solving practical problems.

As a result of such calculation, the applicant may receive from 0 to 40 points for two tasks on the exam.

RECOMMENDED LITERATURE

Main

1. Говорущенко Т.О. Проектування інтерфейсів користувача: Методичні вказівки до виконання лабораторних робіт для студентів спеціальності «Комп'ютерна інженерія» (магістри). Хмельницький: ХНУ, 2019. – 204 с

2. Проектування інформаційних систем: Загальні питання теорії проектування ІС : навч. посіб. / О.С. Коваленко, Л.М. Добровська. – Київ : КПІ ім. Ігоря Сікорського, 2020. – 192с.

3. Об'єктно-орієнтоване програмування. Методичні рекомендації до лабораторних робіт для студентів спеціальності 121 "Інженерія програмного забезпечення" першого (бакалаврського) рівня [Електронний ресурс] / уклад. Ю. Е. Парфьонов, О. В. Щербак; Харківський національний економічний університет ім. С. Кузнеця. - Електрон. текстові дан. (1,60 МБ). - Харків : ХНЕУ ім. С. Кузнеця, 2021. - 92 с. <http://repository.hneu.edu.ua/handle/123456789/27252>

4. Грабовський Є. М. Проектування інтелектуального користувацького інтерфейсу систем підтримки електронного навчання / Є. М. Грабовський // Scientific Journal «ScienceRise». - № 11(52). - 2018. - С. 36-39. <http://repository.hneu.edu.ua/handle/123456789/20401>

5. Бережна О. Б. Принципи побудови адаптивного інтерфейсу мультимедійних додатків / О. Б. Бережна // Поліграфія і видавнича справа. – 2022. – № 1 (83). – С. 80-87. <http://repository.hneu.edu.ua/handle/123456789/28382>

6. Hrabovskyi Y., Fedorchenko V. Development of the optimization model of the interface of multimedia edition. EUREKA: Physics and Engineering. 2019. № 3.

Additional

7. Гризун Л. Е. Розроблення графічного компонента як складника інформаційно-навігаційної системи сучасного університету / Л. Е. Гризун, Б. О. Біда // Вісник Харківського національного автомобільно-дорожнього університету. – 2022. – № 96. – С. 22-29.
<http://repository.hneu.edu.ua/handle/123456789/27678>

8. Гризун Л.Е., Щербаков О.В. Алгоритмічні та інтерфейсні рішення для проектування мобільної інформаційно-навігаційної системи університету Сучасні інформаційні технології та системи [Електронний ресурс] : монографія / Н. Г. Аксак, Л. Е. Гризун, О. В. Щербаков та ін. ; за заг. ред. д-ра екон. наук, професора В. С. Пономаренка. – Харків : ХНЕУ ім. С. Кузнеця, 2022. с. 35-82
<http://repository.hneu.edu.ua/handle/123456789/29233>

9. Говорущенко Т.О. Проектування інтерфейсів користувача: Методичні вказівки до виконання лабораторних робіт для студентів спеціальності «Комп'ютерна інженерія» (магістри). – Хмельницький: ХНУ, 2019. – 204 с.

10. Bilousova L., Gryzun L., Zhytienova N. Fundamentals of UI/UX design as a component of the pre-service specialist's curriculum / L. Bilousova, L. Gryzun, N. Zhytienova // SHS Web Conf. Volume 104, 02015 (2021) Second International Conference on History, Theory and Methodology of Learning (ICHTML 2021)
Режим доступу: https://www.shs-conferences.org/articles/shsconf/abs/2021/15/shsconf_ichtml2021_02015/shsconf_ichtml2021_02015.html (Web of Science)
<http://repository.hneu.edu.ua/handle/123456789/27153>)

11. Bilousova L., Gryzun L., Lytvynova S. Practice of applying functional approach to the design of digital learning aids L I Bilousova et al 2022 J. Phys.: Conf. Ser. 2288 (2022) 012008 Режим доступу <https://iopscience.iop.org/article/10.1088/1742-6596/2288/1/012008> (Scopus)

Information resources

12. Проектування інтерфейсу програмних систем (121.010) (ПНС-курс)
<https://pns.hneu.edu.ua/course/view.php?id=7377#section-0>

13. Навчаємось працювати в Figma. Відеоуроки.
<https://www.youtube.com/watch?v=8jCKxNGSUtk>

14. Figma українською Відеоуроки.
https://www.youtube.com/watch?v=VouVsut_-Ak