MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
LUTSK NATIONAL TECHNICAL UNIVERSITY
FACULTY OF DIGITAL, EDUCATIONAL AND SOCIAL TECHNOLOGIES

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28.08.2026

APPROVED
First Vice-Rector
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29.08.2026

SYLLABUS

of the educational component "Web Technologies and Web Design"
higher education degree – Bachelor
field of knowledge – A Education
specialty – A4.09 Secondary Education (Informatics)
educational programme – Secondary education. Informatics

Department of Digital Educational Technologies

Syllabus developed by Associate Professor, PhD Yuliia MELNYCHUK

The syllabus was approved at the meeting of the Department of Digital Educational Technologies, minutes No. 1a of 28.08.2026

Head of the Department PhD, Associate Professor Vitalii KABAK

Reviewed and approved by the support group of the educational programme "Secondary education. Informatics", minutes No. 1a of 28.08.2026

Guarantor of the educational programme "Secondary education. Informatics" PhD, Associate Professor Yuliia MELNYCHUK

Approved by the Scientific and Methodological Council of the University, minutes No. 1/a of 29.08.2026

Approved syllabus online:
https://e.lntu.edu.ua/syllabus/3559

Lutsk – 2026

SYLLABUS OF THE EDUCATIONAL COMPONENT "Web Technologies and Web Design"

Educational programme	Secondary education. Informatics
Field of knowledge / Specialty	A Education / A4.09 Secondary Education (Informatics)
Level of higher education	First (Bachelor's) Level
Course status	compulsory
Language of instruction	English
Workload	6 ECTS credits / 180 hours, semester 3
Form of final assessment	exam, course paper
Lecturer(s)	PhD, Associate Professor Yuliia MELNYCHUK

1. Course aim and objectives

Aim: The purpose of teaching this academic discipline is to form a system of theoretical knowledge about the technological components of the WWW service, their place among other computer technologies, and a set of skills for creating documents for the WWW service and placing them on the Internet

Objectives: The main objectives of studying the discipline Web Technologies and Web Design are to:
- develop students' understanding of the principles, structure, and functioning of modern web technologies and web environments;
- form knowledge and practical skills in designing, developing, and maintaining web pages and websites;
- teach students to use HTML, CSS, and JavaScript to create functional and aesthetically appealing web interfaces;
- introduce the basics of responsive and user-centered design to ensure accessibility and usability across various devices;
- provide experience with modern web development tools, frameworks, and content management systems (CMS);
- foster creative and critical thinking in solving design and technical problems in web projects;
- develop teamwork and communication skills for collaborative web development;
- encourage the application of ethical, legal, and accessibility standards in web design and development.

2. Competences

IC — integral competence: Ability to solve complex specialized tasks in the field of secondary education, involving the application of theoretical knowledge and practical skills in subject-specific disciplines, pedagogy, psychology, educational theory, and teaching methodology, and characterized by complexity and uncertainty in the conditions of organizing the educational process in general secondary education institutions.

GC01 — Ability to think abstractly, analyze and synthesize information, and apply knowledge in practical situations.

GC02 — Knowledge and understanding of the subject area and professional activities.

GC03 — Ability to communicate effectively in the official state language, both orally and in writing, and to communicate in a foreign language within the subject specialization.

GC04 — Ability to navigate the information environment, search for, analyze, and process information from various sources, and effectively use digital resources and technologies in the educational process.

GC11 — Ability to organize and plan activities.

GC12 — Ability to learn and acquire up-to-date knowledge.

SC01 — Ability to transfer a system of scientific knowledge into professional activities and apply it

within the context of the subject taught.

SC08 — Ability to engage in subject-to-subject (equal and learner-centered) interaction with students in the educational process and involve parents in the educational process on the principles of partnership.

SC10 — Ability to apply knowledge of scientific facts, concepts, theories, principles, and methods of modern computer science in the practice of teaching informatics.

SC13 — Ability to use general-purpose and specialized software tools to solve applied problems in computer science.

SC17 — Ability to digitally represent and process textual, numerical, graphical, audio, and video information.

SC20 — Ability to understand the specific features of computer design related to the main tasks of using and distributing multimedia, as well as the fundamental principles of working with multimedia.

SC21 — Ability to develop software using modern object-oriented, application, and web programming technologies, as well as database and knowledge base management technologies, employing appropriate computational models, methods, algorithms, data structures, and control mechanisms.

SC22 — Ability to apply modern web technologies, fundamental approaches, methods, and tools of web design in professional activities.

SC23 — Ability to design human activities in human–technology–environment systems, ensure mutual adaptation between humans and technology at the informational, energy, and material levels, and evaluate the effectiveness of ergonomic solutions.

3. Course structure, distribution of hours, links between topics and competences

No.	Topic	Lectures full-time/ part-time	Lab. full-time/ part-time	Self-study full-time/ part-time	Total	Teaching methods	Assessment methods	GC and SC
Content module 1. Fundamentals of Creating and Styling Web Pages								
1	Topic 1. Introduction to HTML	3/0.75	3/0.75	12/17	18/18.5	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC02, GC04, GC11, GC12, SC10, SC13, SC22
2	Topic 2. HTML Text Tags	3/0.75	3/0.75	12/17	18/18.5	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC01, GC02, SC17, SC22
3	Topic 3. Using Links and Images	3/0.75	3/0.75	12/16.75	18/18.25	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC02, GC04, SC13, SC17, SC20, SC22, SC23

No.	Topic	Lectures full-time/ part-time	Lab. full-time/ part-time	Self-study full-time/ part-time	Total	Teaching methods	Assessment methods	GC and SC
4	Topic 4. Basics of CSS	3/0.75	3/0.75	12/16.75	18/18.25	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC01, GC02, SC13, SC22
5	Topic 5. Block and Inline Elements. Website Structure. Semantic Elements in HTML	3/0.5	3/0.5	12/16.75	18/17.75	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC01, GC11, SC01, SC21, SC22, SC23
6	Topic 6. Combining Selectors. Cascading and Specificity	3/0.5	3/0.5	12/16.75	18/17.75	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC01, GC12, SC13, SC21, SC22
Content module 2. Creating Interactive Web Pages								
7	Topic 7. Introduction to JavaScript	3/0.5	3/0.5	12/16.75	18/17.75	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC01, GC02, GC12, SC10, SC21, SC22
8	Topic 8. Developer Console Features in JavaScript	3/0.5	3/0.5	12/16.75	18/17.75	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC01, GC04, GC12, SC13, SC21
9	Topic 9. Arrays and Objects in JavaScript	3/0.5	3/0.5	12/16.75	18/17.75	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC01, GC02, SC21, SC22
10	Topic 10. JavaScript Functions	3/0.5	3/0.5	12/16.75	18/17.75	TM1, TM2, TM3, TM4, TM5, TM6, TM7	AM2, AM3, AM4, AM5, AM7	GC01, GC03, GC11, SC13, SC21, SC22

No.	Topic	Lectures full-time/ part-time	Lab. full-time/ part-time	Self-study full-time/ part-time	Total	Teaching methods	Assessment methods	GC and SC
	Total	**30/6**	**30/6**	**120/168**	**180/180**			

Legend: GC — general competence (number according to section 2); SC — special (professional) competence (number according to section 2). The full wording of each code is given in the educational programme / standard of the specialty.

Teaching methods: TM1 — verbal method (lecture, discussion, interview, etc.); TM2 — practical method (laboratory and practical classes); TM3 — visual method (illustration and demonstration); TM4 — work with educational and methodological literature (note-taking, abstracts, annotations, reviews, essays); TM5 — video method combined with up-to-date information technologies and computer-based learning tools (distance, multimedia, web-based, etc.); TM6 — independent work (problem solving); TM7 — individual research work of students.

Assessment methods: AM2 — oral or written survey; AM3 — colloquium; AM4 — testing; AM5 — team projects; AM7 — presentation of the results of completed tasks and research.

4. Learning outcomes

PLO07. Demonstrates knowledge of the fundamentals of basic and applied sciences (according to the subject specialization) and uses the fundamental categories and concepts of the relevant subject area.

PLO08. Formulates well-reasoned opinions in the field of professional knowledge for both specialists and the general public in Ukrainian and foreign languages.

PLO09. Applies modern information and communication technologies and digital technologies in professional activities.

PLO14. Identifies the structure of computer science as a subject area and its place within the system of sciences, explains the prospects for the development of computer science and information technologies, and understands their social significance.

PLO16. Uses information and communication technologies to present, edit, store, and transform textual, numerical, graphical, audio, and video information.

PLO19. Knows and understands the ethical and legal principles of using information and communication technologies; applies tools and methods for information protection and Internet security.

PLO22. Implements problem-solving algorithms using programming languages, selects and applies information and communication technologies, and solves problems of varying levels of complexity from the school informatics curriculum.

5. Sustainable Development Goals

SDG 4 – Quality Education

SDG 9 – Industry, Innovation and Infrastructure

6. Non-formal education

Recommended Courses, Training Programs, Internships, and Other Activities: Learning outcomes acquired through formal, non-formal, or informal education may be recognized in accordance with the procedures established by Lutsk National Technical University (LNTU). Supporting evidence may include certificates of relevant training programs, webinars, or online courses, accompanied by a description of the learning outcomes achieved and, where necessary, a short verification task or portfolio.

7. Assessment criteria and forms of control

Assessment is based on a 100-point scale (national scale / ECTS). Final grade = continuous assessment (25 %) + module tests (20 %) + course paper (15 %) + exam (40 %).

Academic integrity: independent completion of assignments; correct citation of sources; marking parts of the text generated by AI tools. Violations of academic integrity are not tolerated.

8. Content of topics

Topic 1. Introduction to HTML

Principles of the Internet. Web page planning. Installing essential software. Physical placement of a web page. Working with files. What is HTML. Structure of an HTML element.

Topic 2. HTML Text Tags

HTML headings. HTML paragraphs. HTML horizontal rules. HTML line breaks. HTML styles. Fonts. HTML text formatting. HTML colors.

Topic 3. Using Links and Images

Embedding links on a web page. Placing images on a web page. Alternative text. Image width and height. Embedding images. Media assets and image licensing.

Topic 4. Basics of CSS

What is CSS. Using CSS. Syntax of CSS rules. Methods of including CSS. CSS comments.

Topic 5. Block and Inline Elements. Website Structure. Semantic Elements in HTML

Block-level elements. Inline elements. The and elements. Website structure. Main sections of a document. HTML for content structuring. HTML layout elements. Semantic elements in HTML.

Topic 6. Combining Selectors. Cascading and Specificity

Combinators. Child combinators. Inheritance. Creating complex nested selectors. Using combinators. Specificity. Combining inheritance and specificity. The concept of cascading.

Topic 7. Introduction to JavaScript

What is JavaScript? JavaScript and Java. JavaScript and the ECMAScript specification. Getting started with JavaScript. Running JavaScript. Multiline input in the console. Variables. Comments. Operators. Conditional expressions. Functions. Events. Examples.

Topic 8. Developer Console Features in JavaScript

Storing necessary information. Variables. Declaring a variable. Variable initialization. The var keyword. Variable naming rules. Variable types. Objects. Constants in JavaScript. The difference between const and let.

Topic 9. Arrays and Objects in JavaScript

Arrays. Creating an array. Array indexes. Accessing and modifying array elements. Finding array length. Array methods. Introduction to JavaScript objects. Objects as properties of other objects.

Topic 10. JavaScript Functions

Functions as reusable code blocks. Built-in browser functions. Functions vs. methods. Calling functions. Function parameters. Optional parameters. Default parameters. Anonymous and arrow functions. Function scope and conflicts.

9. Course paper

The purpose of the coursework is to systematize, consolidate, and deepen the knowledge acquired during the study of the theoretical and practical components of the discipline “Web Technologies and Web Design” and other professionally oriented disciplines in the field 01 “Education/Pedagogy”.

It also aims to develop the ability to independently design, make, and implement project and organizational–economic decisions when creating websites for any object and in any subject area (banking, manufacturing, trade, marketing, finance, insurance, etc.), as well as to cultivate students’ skills in independent research and practical activity.

Main Objectives of the Coursework in “Web Technologies and Web Design”

- To select and justify the necessity and feasibility of developing web applications and determine the composition of functional tasks;
- To analyze modern web technologies in a specific domain;

- To prepare system requirements and a work implementation plan;
- To formulate and algorithmize tasks;
- To design and provide the information technology framework;
- To implement tasks using computer-based solutions;
- To prepare the required project and organizational–technological documentation;
- To calculate the economic efficiency of implementing the proposed solution.

The degree to which these objectives are achieved determines the student's level of knowledge and practical readiness, as well as their ability to independently conduct research, make informed decisions during system development, and bring them to practical implementation under conditions close to real-world scenarios.

The main methods applied in the coursework should include the system approach, operations research, and modeling.

The essence of using these methods lies in representing a web application as a holistic system, whose elements are interconnected and interact with each other and with other systems through technological operations, considering their characteristics, mutual requirements, and mutual influence.

This ensures the integration of the system's functional elements at the informational, software, technical, and organizational levels.

Approximate Topics for Coursework

Development of a web design concept and creation of a website for a private enterprise specializing in:

- freight transportation;
- packaging production;
- publishing;
- bakery production;
- construction;
- photography and videography services;
- coffee and tea supply;
- pharmaceutical production;
- hotel services;
- restaurant services;
- sports complex;
- travel agency;
- home appliance supermarket;
- grocery supermarket;
- furniture manufacturing;
- beauty salon;
- stationery supermarket;
- security agency;
- car dealership;
- gas station;
- archive;
- betting company;
- periodical publication;
- educational services;
- recruitment agency;
- museum;
- marketplace;
- hair salon;
- dental clinic;
- insurance company;
- farming enterprise;
- forestry enterprise;
- credit institution.

10. General requirements

The educational process is governed by the academic regulations of LNTU. Students are required to read the requirements set out in the LNTU Code of Academic Integrity and the LNTU Policy on the Ethical Use of Artificial Intelligence, and to adhere to the principles of academic integrity and the ethical use of artificial intelligence in their educational activities.

Academic integrity. Participants of the educational process must comply with the Law of Ukraine “On Academic Integrity” of 18.12.2025 No. 4742-IX and the internal regulations of LNTU. Academic plagiarism, fabrication, falsification, misappropriation of authorship, non-independent completion of assignments, as well as dishonest use of results generated by artificial intelligence are not allowed.

Use of artificial intelligence. Artificial intelligence tools may be used to search for ideas, explain methods, provide preliminary structuring, language editing and auxiliary analysis of non-confidential data, unless a specific assignment requires fully independent work. Students must indicate the tool used, the purpose and the stage of its use, check facts and calculations, and justify their conclusions independently.

11. References

I. Teaching and methodological materials

Works by the syllabus author:

1. Melnychuk, Yu. Ye. (Comp.). (2022). Web Technologies and Web Design: Lecture Notes for First-Cycle (Bachelor’s) Students of the Educational Programme “Vocational Education (Computer Technologies)”, Specialty 015.39 “Vocational Education (Digital Technologies)”, Full-Time and Part-Time Modes of Study. Lutsk: Lutsk National Technical University. 72 p. [in Ukrainian].

2. Melnychuk, Yu. Ye. (Comp.). (2022). Web Technologies and Web Design: Guidelines for Laboratory Work for First-Cycle (Bachelor’s) Students of the Educational Programme “Vocational Education (Computer Technologies)”, Specialty 015.39 “Vocational Education (Digital Technologies)”, Full-Time and Part-Time Modes of Study. Lutsk: Lutsk National Technical University. 44 p. [in Ukrainian].

3. Melnychuk, Yu. Ye. (Comp.). (2024). Web Technologies and Web Design: Lecture Notes for First-Cycle (Bachelor’s) Students of the Educational Programme “Secondary Education (Informatics)”, Specialty 014.09 “Secondary Education (Informatics)”, Full-Time and Part-Time Modes of Study. Lutsk: Lutsk National Technical University. 72 p. [in Ukrainian].

4. Melnychuk, Yu. Ye. (Comp.). (2024). Web Technologies and Web Design: Guidelines for Laboratory Work for First-Cycle (Bachelor’s) Students of the Educational Programme “Secondary Education (Informatics)”, Specialty 014.09 “Secondary Education (Informatics)”, Full-Time and Part-Time Modes of Study. Lutsk: Lutsk National Technical University. 44 p. [in Ukrainian].

Works by other authors:

5. Kaplun, V. A., Tsikhotskyi, M. S., Lukichov, V. V. (2023). Fundamentals of Web Programming: Theory and Practice. Electronic Textbook. Vinnytsia: Vinnytsia National Technical University. 128 p. [in Ukrainian]. URL: https://jetiq.vntu.edu.ua/repository/card.php?id=6750&lang=en

6. Yuskovych-Zhukovska, V. I., Bohut, O. M. (2023). Web Programming: Textbook. Rivne: Volynski Oberehy. 384 p. [in Ukrainian].

7. Robbins, J. N. (2025). Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics. 6th ed. O'Reilly Media. 912 p. URL: https://www.oreilly.com/library/view/learning-web-design/9781098137670/

8. Meyer, E. A., Weyl, E. (2023). CSS: The Definitive Guide. 5th ed. O'Reilly Media. 1128 p. URL: https://www.oreilly.com/library/view/css-the-definitive/9781098117603/

9. Freeman, E., Robson, E. (2024). Head First JavaScript Programming. 2nd ed. O'Reilly Media. 662 p. URL: https://www.oreilly.com/library/view/head-first-javascript/9781098147938/

10. Haverbeke, M. (2024). Eloquent JavaScript. 4th ed. No Starch Press. 456 p. URL: https://www.oreilly.com/library/view/eloquent-javascript-4th/9781098182502/

11. Morgan, N. (2024). JavaScript Crash Course. No Starch Press. 376 p. URL:

https://www.oreilly.com/library/view/javascript-crash-course/9781098168797/

12. Wilson, K. (2023). The Absolute Beginner's Guide to HTML and CSS: A Step-by-Step Guide with Examples and Lab Exercises. Apress. 244 p. URL: https://www.oreilly.com/library/view/the-absolute-beginners/9781484292501/

13. Hart-Davis, G. (2023). Teach Yourself VISUALLY HTML and CSS. 2nd ed. Wiley. 320 p. ISBN: 9781394160686.

14. McFedries, P. (2023). HTML, CSS, & JavaScript All-in-One For Dummies. Wiley. 848 p. URL: https://www.oreilly.com/library/view/html-css/9781394164684/

II. Scientific works

Works by the syllabus author:

15. Melnychuk, Yu. Ye. (2023). Development of Algorithms for Creating Web-Oriented Information Systems. Science and Technology Today, 2(16), 392–400. [in Ukrainian]. DOI: https://doi.org/10.52058/2786-6025-2023-2(16)-392-400

16. Melnychuk, Yu. Ye. (2023). Algorithms for the Functioning of Educational Information Systems. Science and Technology Today, 3(17), 576–585. [in Ukrainian]. DOI: https://doi.org/10.52058/2786-6025-2023-3(17)-576-585

17. Melnychuk, Yu. Ye. (2023). Principles of Designing Educational Information Systems. Computer-Integrated Technologies: Education, Science, Production, 50, 77–84. [in Ukrainian]. DOI: https://doi.org/10.36910/6775-2524-0560-2023-50-11

18. Melnychuk, Yu. Ye., Redko, O. I., Sushyk, O. H. (2025). Information System Interfaces in the Professional Training of Future Informatics Specialists. Science and Technology Today, 8(49), 829–840. [in Ukrainian].

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20. Melnychuk, Yu. Ye., Sachuk, Yu. V., Salanda, I. P. (2020). Development and Implementation of a Web Portal for Teaching Informatics in General Secondary Education Institutions. Youth and Market, 3–4(182–183), 58–62. [in Ukrainian].

21. Kvasnyi, O., Melnychuk, Yu. (2026). Practical Aspects of Using Selenium WebDriver for Automated Testing of Web Applications. Volyn Spring: The First Sprouts of Science: Proceedings of the 10th All-Ukrainian Student Scientific and Practical Online Conference. Lutsk. P. 682–683. [in Ukrainian].

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22. Swacha, J., Kulpa, A. (2023). Evolution of Popularity and Multiaspectual Comparison of Widely Used Web Development Frameworks. Electronics, 12(17), 3563. DOI: https://doi.org/10.3390/electronics12173563

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24. Kuzikov, B., Tytov, P., Shovkoplias, O. (2025). Analysis of Web Accessibility of Ukrainian Higher Education Institutions' Websites. System Research and Information Technologies. DOI: https://doi.org/10.20535/SRIT.2308-8893.2025.2.10

25. Poniedziałek, A., Pańczyk, B. (2023). Performance Analysis of React v. 18.1.0 and Angular v. 11.0.2 Development Frameworks. Journal of Computer Sciences Institute, 29. DOI: https://doi.org/10.35784/jcsi.3782

26. Kostrzewa, D., Miłosz, M. (2024). Comparative Analysis of the Express.js and ElysiaJS Frameworks in the Context of Web Application Development. Journal of Computer Sciences Institute, 32, 246–250. DOI: https://doi.org/10.35784/jcsi.6335

27. Odeniran, Q., Wimmer, H. (2023). JavaScript Frameworks – A Comparative Study. IEEE IRTM

Conference Proceedings. URL: https://digitalcommons.georgiasouthern.edu/information-tech-facpubs/163

28. Karić, A., Durmić, N. (2024). Comparison of JavaScript Frontend Frameworks – Angular, React, and Vue. International Journal of Innovative Science and Research Technology, 1383–1390. DOI: https://doi.org/10.38124/ijisrt/ijisrt24jun600

III. Information resources

29. MDN Web Docs. Learn Web Development: Comprehensive Tutorials, Learning Materials, and Reference Documentation on HTML, CSS, and JavaScript. URL: https://developer.mozilla.org/en-US/docs/Learn_web_development

30. W3Schools. Online Web Tutorials: Interactive Tutorials, Code Examples, Exercises, and Quizzes on HTML, CSS, JavaScript, and Other Web Technologies. URL: https://www.w3schools.com/

31. JavaScript.info. The Modern JavaScript Tutorial: A Comprehensive Guide to JavaScript Programming, from Fundamental Concepts to Advanced Topics. URL: https://javascript.info/

32. WHATWG. HTML Living Standard: The Official Living Standard for the HTML Language and Related Web APIs. URL: https://html.spec.whatwg.org/

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34. World Wide Web Consortium (W3C). Web Accessibility Initiative (WAI): Guidelines, Standards, and Educational Resources for Accessible Web Content and Applications. URL: https://www.w3.org/WAI/

35. web.dev. Web Development Guidance: Best Practices, Tutorials, and Resources on Modern Web Development, Performance, Accessibility, and Responsive Design. URL: https://web.dev/

36. CodePen. Online Code Editor: An Interactive Development Environment for Creating, Editing, Testing, and Sharing HTML, CSS, and JavaScript Projects. URL: https://codepen.io/

37. JSFiddle. Online Code Playground: A Browser-Based Environment for Writing, Testing, and Sharing HTML, CSS, and JavaScript Code. URL: https://jsfiddle.net/

38. freeCodeCamp. Learn to Code for Free: Interactive Courses, Coding Challenges, and Practical Projects in Responsive Web Design, JavaScript, and Web Development. URL: https://www.freecodecamp.org/