Requirements to Open Online Course on Open Science

OPTIMA

Open Practices, Transparency and Integrity for Modern Academia

Version 2.0
PUBLIC

[This deliverable presents findings from two workshops (Nice, June 12-16, 2023 and Graz, October 16-20, 2023) for Ukrainian higher education institutions (HEIs) on gathering best practices and requirements for the creation and implementation of open online courses and presents a case of informational support, environment and structure of Open Online Course on Open Science.]

Programme: Erasmus+
Key Action: Cooperation for innovation and the exchange of good practices
Action Type: Capacity building in higher education
Project Reference: 618940-EPP-1-2020-1-UA-EPPKA2-CBHE-JP

With the support of the Erasmus+ Programme of the European Union

Document Description

D1.6 – Requirements to open online course on Open Science

1.6 Requirements to open online course on Open Science			
Learning EU Best Practices			
Due date:	September 15, 2023	Actual delivery date:	September 15, 2023 (updated version – November 15, 2023)
Nature of document	*Report*	Version	2.0
Dissemination level	*Public*		
Lead partner	Sumy State University		
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Revision History

Issue	Item	Comments	Author/Reviewer
v1.0	Draft Version	The first draft based on UCA workshops' field notes.	Artem Artyukhov, Yurii Zuban
V1.1	Revised Draft	Structure and sections added based on the possibilities of the "Examenarium" platform at Sumy State University.	Artem Artyukhov, Yurii Zuban
V1.2.	Revised Draft sent tot he OPTIMA partners for feedback	Received feedback from two consortium members; related changes have been incorporated into the report text	Artem Artyukhov
V1.3	MS Word Doc	Downloaded the doc from Google Docs into MS Word	Artem Artyukhov
V1.4	OPTIMA Template	Incorporated the text into the OPTIMA deliverable template	Artem Artyukhov
V1.5	Finalisation	Incorporating/deleting of all remaining comments	Artem Artyukhov
V2.0	Updated Version after the TU Graz workshop	Incorporating field notes and results of discussions held during the TU Graz Workshop (16-20.10.2023), updating technical information	Artem Artyukhov, Yurii Zuban

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Executive summary

Aims: This report summarizes findings from two workshops for Ukrainian higher education institutions (HEIs) on gathering best practices for creating and implementing an Open Online Course on Open Science. It develops recommendations for an Open Online Course on Open Science and describes the informational and e-learning environment of the Sumy State University as a responsible partner for creating an Open Online Course on Open Science on the "Examenarium" platform.

Findings: In the dynamic landscape of contemporary education, online courses catalyze a profound transformation in how knowledge is disseminated and acquired. The digital revolution has redefined the traditional classroom and paved the way for a globalized and accessible learning environment. With their inherent flexibility, scalability, and vast subject offerings, online courses have transcended geographical and temporal limitations. The project team proposed the optimal content and technical implementation of the Open Online Course on Open Science creation.

Recommendations: The project team has proposed the structure of an Open Online Course on Open Science that aligns with modern requirements and project specifications. Details of the project's technical implementation have been discussed with the developers of the "Examenarium" platform. The main requirements for the Open Online Course on Open Science are outlined in Section 2, and the features of the technical implementation are described in Section 4 of this report.

1. Introduction

The evolution of online learning marks a departure from conventional pedagogical methods, offering learners the autonomy to tailor their educational journey to personal schedules and preferences. The accessibility of courses ranging from academic disciplines to specialized skills training has democratized education, breaking down barriers and providing learning opportunities to a diverse and global audience. The emergence of Open Online Courses, interactive webinars, and virtual classrooms has reshaped the educational narrative, making learning a collaborative and interactive experience.

Beyond mere convenience, the role of online courses extends into fostering a culture of continuous learning. In a world where information undergoes constant updates and innovations, adapting and acquiring new skills is paramount. Online courses bridge the gap between traditional education and the demands of a rapidly changing job market and empower individuals to stay abreast of emerging trends and advancements.

In the ever-expanding realm of knowledge dissemination, online courses have emerged as instrumental tools, propelling the ethos of transparency, collaboration, and accessibility in scientific inquiry. As a paradigm, Open Science advocates for the unrestricted sharing of research outputs, methodologies, and data, fostering an environment where information is a public good rather than a proprietary asset.

Online courses on Open Science play a pivotal role in democratizing access to scientific knowledge. By providing a platform for researchers, academics, and enthusiasts worldwide, these courses break down geographical barriers and empower a diverse community to engage in the scientific discourse. The collaborative nature of Open Science is amplified through the interactive features of online courses, where participants can exchange ideas, contribute to ongoing research projects, and collectively advance the boundaries of human understanding.

Moreover, the importance of online courses on Open Science extends to cultivating a culture of reproducibility and rigor in scientific practices. As participants engage with open methodologies and explore transparent research workflows, they enhance their scientific literacy and contribute to the broader scientific community's commitment to reliability and verifiability.

In the context of academia, online courses on Open Science serve as catalysts for a paradigm shift, challenging traditional notions of scholarly communication and incentivizing a more inclusive, collaborative, and ethically grounded research environment. Emphasizing principles like open access publishing, data sharing, and

open peer review, these courses empower individuals to become champions of a more transparent and equitable scientific ecosystem.

Online courses on Open Science are not just educational endeavors; they are vehicles for cultural change within the scientific community. By equipping learners with the knowledge and tools to embrace openness, collaboration, and accountability, these courses contribute significantly to shaping the future trajectory of scientific inquiry—one that is open, inclusive, and dedicated to the betterment of society.

This document outlines examples of best practices in creating online courses, the e-learning ecosystem of Sumy State University, and the structure of an online course on Open Science that will be developed on the "Examenarium" platform.

2. Best Practices in the Creation and Implementation of Open Online Courses

Interactive communication with speakers and project team brainstorming during workshops allowed for forming a list of 13 "tips" for creating a successful course. These "tips" were used to develop the framework for an Open Online Course on Open Science.

1. **Clear goals and structure (Syllabus and Learning Outcomes).** Define clear educational goals and create a structured curriculum. It helps learners navigate the materials more efficiently and understand what to expect from each lesson.
2. **Navigation simplicity.** Ensure a simple and intuitively navigable course layout. Learners should find it easy to navigate through the materials.
3. **Clear structure of educational materials**.
4. **Interactive elements.** Use interactive teaching methods, such as tests and practical case studies. Interacting with the material contributes to better comprehension and retains students' attention.
5. **Multimedia resources.** Vary the types of materials by providing video, audio, text, and graphics. Diverse multimedia resources help adapt to different learning styles.
6. **Information visualization.** Use graphics and diagrams to visualize concepts. Visual materials can significantly enhance information retention.
7. **Practical cases.** Provide real examples and scenarios from practice. It helps learners better understand how to apply the acquired knowledge.

8. **Use of diverse teaching methods.** Vary teaching methods, including video tutorials, audio recordings, textual materials, and interactive assignments. It allows catering to different learning styles.
9. **Balanced volume of material.** Maintaining a balance between adequate study material and preventing information overload.
10. **Additional resources support.** Provide a list of additional resources for deeper exploration of the topic.
11. **Encouragement of active learning.** Provide assignments that require active student engagement.
12. **Feedback support.** Ensure a feedback system, including comments on assignments, grades, and the opportunity to ask questions. It creates a more favorable learning environment.
13. **Network interaction.** Create forums or groups for discussion and interaction among students.

3. University Information System and E-learning Ecosystem at Sumy State University

The University support information system consists of a number of blocks, each of which is directly or indirectly a part of the e-learning environment (Figure 1):

- unit "Official domain of the University" – a coordinating navigator element;
- unit "Information-analytical system "University" – ensuring the process of managing educational activities;
- unit "Management system "Electronic cabinet" - services for communication of participants in the educational process;
- unit "Register of the main regulatory framework of the management system for the activity of the University" – normative support, algorithms and procedures for the implementation of the educational process;
- "Library information system" unit – providing access to educational materials and electronic subscription services;
- unit "E-learning environment" - the actual learning environment (Figure 2).

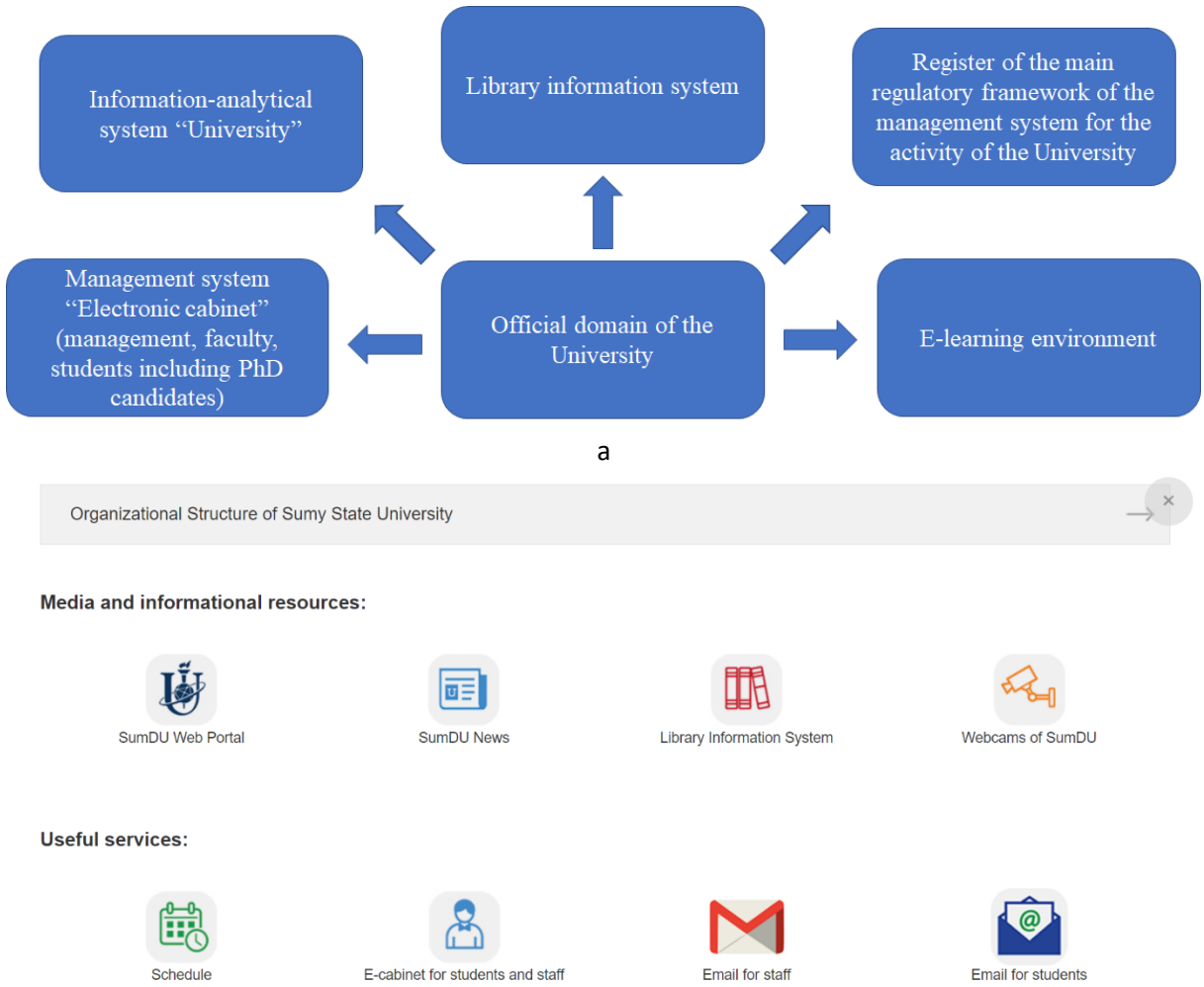


Figure 1 - Figure legend

Figure 1 – University information system (Sumy State University case): a – general structure; b - organizational structure (https://sumdu.edu.ua/uk/)

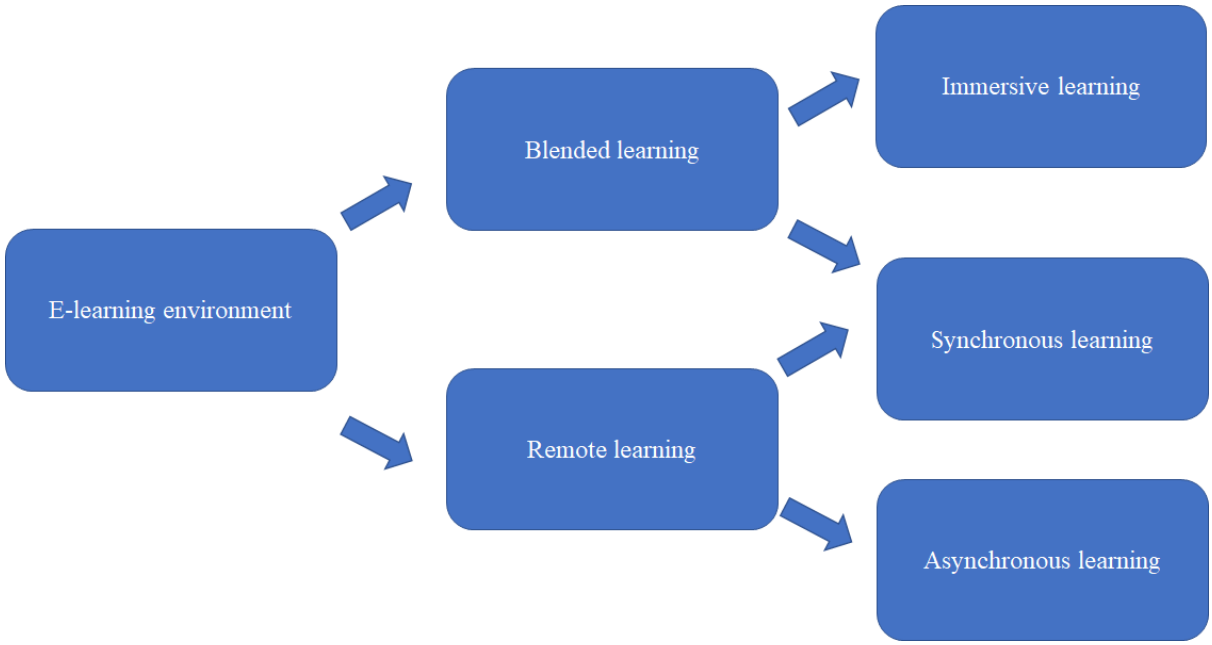
The open online course platform "Examenarium" (http://examenarium.sumdu.edu.ua/) (Figure 3) is an automated system created based on the "Salamstein" platform. The Examenarium platform involves the creation of educational content for online courses using its proprietary editor, Lectur.ED, and the import of SCORM packages developed by other means.

The proprietary editor supports the creation of:

- Nine types of tests.
- Web pages, files, links to external resources, and cross-references to materials.
- Open-ended assignments for instructor evaluation.
- Classroom discussions with the option for assessment.
- Tasks for creating collaborative documents.

- Peer assessment tasks.
- The ability to evaluate additional learner activities.
- Dictionaries, auto content, keywords, and more.
- Summative tests with the option for video monitoring.

The platform supports the generation of certificates based on course completion results. It also allows recording individual open online courses and programs of such courses. The platform facilitates program enrollment through unique private links for specific groups of participants.



a

b

Figure 2 – E-learning environment (Sumy State University case): a - general structure; b - organizational structure (https://elearning.sumdu.edu.ua/)

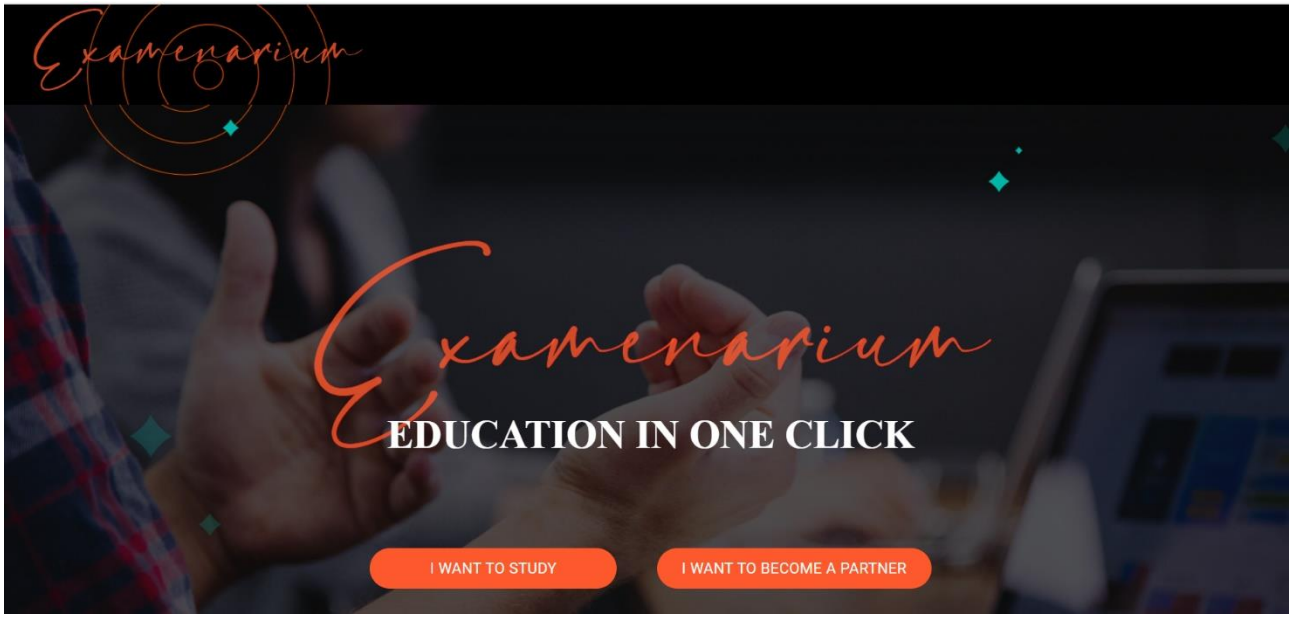


Figure 3 – Platform of open online courses "Examenarium" (https://examenarium.sumdu.edu.ua/)

4. Designer of educational materials and Structure of Open Online Course on Open Science

4.1. Designer of educational materials "Lectur'ED"

Designer of educational materials "Lectur'ED" (http://elearning.sumdu.edu.ua/) (Figure 4) offers several functionalities:

1. Creation/Editing of Educational Projects.

Users can create and edit projects containing educational and methodological materials.

2. Importing from OCW SumDU.

Materials published on OCW SumDU and within the SumDU distance learning system can be imported into the tool.

3. Exporting to OCW SumDU.

Users can export educational and methodological materials to OCW SumDU and the SumDU distance learning system.

4. Integration of Materials.

The tool enables the integration of materials from the electronic catalog, SumDU's institutional repository, and other web resources within a unified educational discipline project.

5. Access Management.

Users can control access to educational and methodological materials, including individual learning objects.

6. Publication on OCW SumDU.

The tool facilitates the publication of educational and methodological materials on OCW SumDU.

The implemented unified software-information model for presenting educational content allows for material searches based on various parameters on OCW SumDU. It offers materials in a convenient format for students and provides for exporting material as a distance course to the SumDU distance learning platform (http://dl.sumdu.edu.ua). The tool integrates materials with global open educational resource aggregators.

Moreover, interested parties can create educational content using the open "Lectur'ED" instructional material constructor. Electronic educational materials published by instructors on OCW are available for independent study by students and for completing self-directed assignments. Educational content can be shared on various social networks to facilitate meaningful discussions.

Other authors, including instructors and students, can import published educational content and modify it according to their requirements. This continuous experimentation and content rotation process aims to enhance the quality of materials. The application forms can range from online courses requiring authorized access to open resources accessible to anyone.

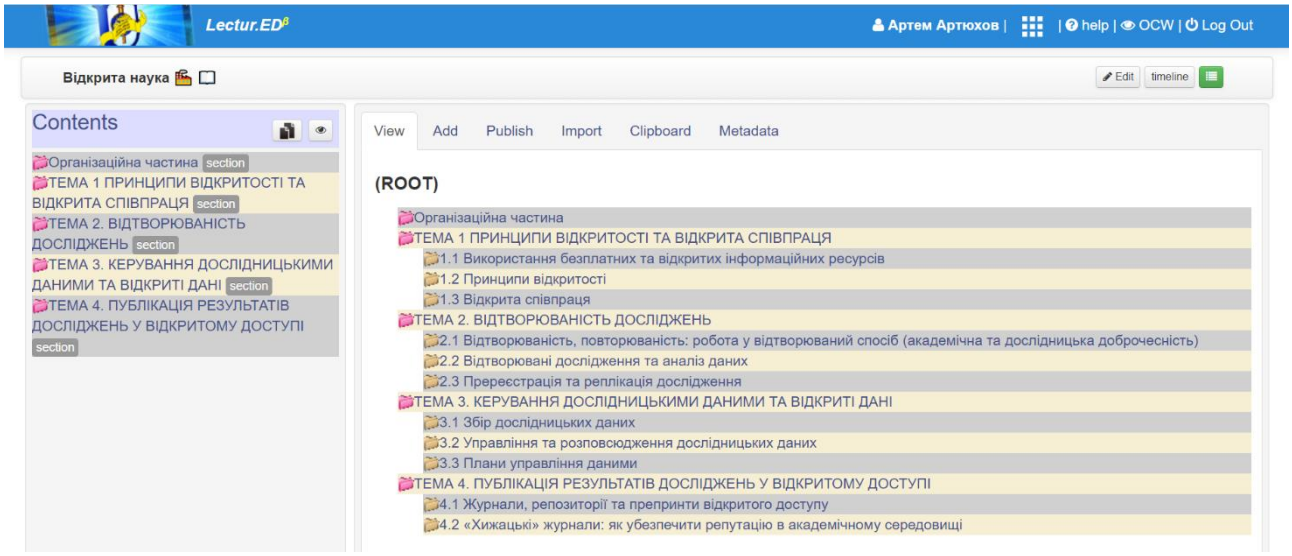


Figure 4 – Designer of educational materials (personal page of course developer, the core of Open Online Course on Open Science https://elearning.sumdu.edu.ua)

The procedure for creating and reviewing the open online course is presented in Figure 5.

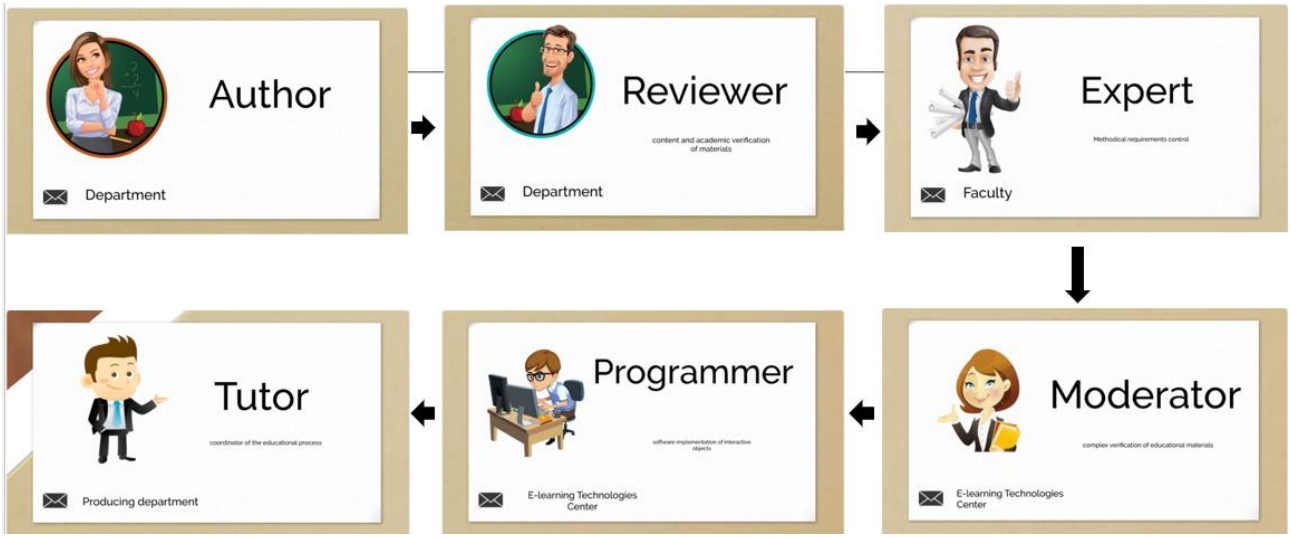


Figure 5 – Algorithm of creating and reviewing the open online course

4.2. Structure of Open Online Course on Open Science

Introduction.

Video Introduction.

Course Syllabus.

Learning Outcomes.

TOPIC 1. PRINCIPLES OF OPENNESS AND OPEN COLLABORATION. Video Introduction to Topic 1.

1.1. Use of Free and Open Information Resources.

- Main Material for Subsection 1.1.
- Presentation for Subsection 1.1.
- Video Recording for Subsection 1.1.
- Examples for Subsection 1.1.
- Reference List for Subsection 1.1.

1.2. Principles of Openness.

- Main Material for Subsection 1.2.
- Presentation for Subsection 1.2.
- Video Recording for Subsection 1.2.
- Examples for Subsection 1.2.
- Reference List for Subsection 1.2.

1.3. Open Collaboration.

- Main Material for Subsection 1.3.
- Presentation for Subsection 1.3.

- Video Recording for Subsection 1.3.
- Examples for Subsection 1.3.
- Reference List for Subsection 1.3.

Test for Topic 1

TOPIC 2. REPRODUCIBILITY OF RESEARCH. 2.1. Reproducibility, Replicability: Working in a Reproducible Manner (Academic and Research Integrity).

- Main Material for Subsection 2.1.
- Presentation for Subsection 2.1.
- Video Recording for Subsection 2.1.
- Examples for Subsection 2.1.
- Reference List for Subsection 2.1.

2.2. Reproducible Research and Data Analysis.

- Main Material for Subsection 2.2.
- Presentation for Subsection 2.2.
- Video Recording for Subsection 2.2.
- Examples for Subsection 2.2.
- Reference List for Subsection 2.2.

2.3. Preregistration and Replication of Research.

- Main Material for Subsection 2.3.
- Presentation for Subsection 2.3.
- Video Recording for Subsection 2.3.
- Examples for Subsection 2.3.
- Reference List for Subsection 2.3.
- Test for Topic 2

SECTION 3. MANAGEMENT OF RESEARCH DATA AND OPEN DATA. 3.1. Collection of Research Data.

- Main Material for Subsection 3.1.
- Presentation for Subsection 3.1.
- Video Recording for Subsection 3.1.
- Examples for Subsection 3.1.
- Reference List for Subsection 3.1.

3.2. Management and Dissemination of Research Data.

- Main Material for Subsection 3.2.
- Presentation for Subsection 3.2.
- Video Recording for Subsection 3.2.
- Examples for Subsection 3.2.

- Reference List for Subsection 3.2.

3.3. Data Management Plans.

- Main Material for Subsection 3.3.
- Presentation for Subsection 3.3.
- Video Recording for Subsection 3.3.
- Examples for Subsection 3.3.
- Reference List for Subsection 3.3.
- Test for Topic 3

Topic 4. Publication of Research Results in Open Access. Video Introduction to Topic 4.

4.1. Journals, Repositories, and Preprints in Open Access.

- Main Material for Subsection 4.1.
- Presentation for Subsection 4.1.
- Video Recording for Subsection 4.1.
- Examples for Subsection 4.1.
- Reference List for Subsection 4.1.

4.2. "Predatory" Journals: How to Safeguard Reputation in the Academic Environment.

- Main Material for Subsection 4.2.
- Presentation for Subsection 4.2.
- Video Recording for Subsection 4.2.
- Examples for Subsection 4.2.
- Reference List for Subsection 4.2.

List of Additional Useful Links for the Course.

Final Test.

5. References

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