**Laboratory work #1**

**Title:** Design of a scientific research – an overview.

**Aim:** to give information about the information of discipline schedule, main principles of scientific research.

**Questions:**

1. What is research design?
2. Depict the principles of a research design.
3. Justify the scientific research work.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

**Internet resources**

**Laboratory work #2**

**Title:** Analysis of an experimental research papers

**Aim:** to discuss research design and review articles in your research area.

**Questions:**

1. Identify the levels of biological organization and explain their relationship.
2. Describe the design of your experimental work.
3. Discuss the types of methodology used in your research.
4. Distinguish between various types of cells.
5. List the four main classes of macromolecules and describe their structure and function.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

**Internet resources**

**Laboratory work #3**

**Title:** Analysis of a research papers based on field works.

**Aim:** to discuss the basic skills which are essential for designing field researches. Distinguish between various types of articles: theoretical and experimental research.

**Questions:**

1. Determine the structure of design of two types of articles: theoretical and experimental research.
2. Describe the steps of designing of research.
3. Distinguish the design between two types of research articles: theoretical and experimental.
4. Describe the main parts and structure of articles.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

**Internet resources**

**Laboratory work #4**

**Title:** Data presentation and analysis as in a given research paper.

**Aim:** to discuss the methods of statistical data analysis used to represent of research.

**Questions:**

1. Determine the right methods of statistical data analysis in experimental research.

2. Describe the statistical data analysis methods used in research.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

**Internet resources**

**Laboratory work #5**

**Title:** Case study – graphical presentation and analysis of a given data.

**Aim:** Analysis of obtained data in experiments and graphical presentation.

**Questions:**

1. Case study. Explain how and why you chose to use these methods of statistical analysis.
2. Case study. Describe the method of statistical analysis you have chosen and graphical presentation.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Golard A. A field guide to thinking errors: Using neuroscience to classify, avoid, and exploit our biases. 2021, 260 pp.

4 Potochnik, A., Colombo M., Wright C. Recipes for Science, Taylor&Francis, 2019, 327 pp.

5 Meltzoff, J. and H. Cooper. Critical Thinking about Research (2-nd editon).APA (Amazon Kindle), 2018, 335 pp.

6 Rurherford, A. Critical thinkers:methods for clear thinking and analysis in everyday situations from the greatest thinkers in history. Amazon (Great of Kindle Edition), 2018, 173 pp.

**Internet resources**

**Laboratory work #6**

**Title:** Rules and tips for using online research databases.

**Aim:** give a brief overview of online research databases - Web of Science, PubMed, Scopus, Research Gate and etc. Show the rules and importance of this information for future molecular biologists, geneticists and biotechnologists.

**Questions:**

1. Classify online research databases according to their properties and areas of research.

2. Show and describe the terms of use and give advice on using online databases for research.

3. Find the information you need in online research databases - Web of Science, PubMed, Scopus, Research Gate, etc.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

**Internet resources**

**Laboratory work #7**

**Title:** Structure of a research paper.

**Aim:** to describe the main structure of research paper and abstracts and differences between experimental papers and short communications. Characterize the structure of a research paper.

**Questions:**

1. Depict the structure of research paper and abstracts, list their differences.
2. Distinguish experimental papers and short communications.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Aytasheva Z.G. Concise Guidance for Biologists: Preparation of Scientific Publications and Grant Proposals. Kazakh University, 2005, 47 p. (Rus.). and later editions of this guidebook.

4 Dawkins R. The Oxford book of modern writing. 1st paper edition. Oxford University Press, 2009, 419 pp

**Internet resources**

**Laboratory work #8**

**Title:** Communication with the editorial board while submitting a paper.

**Aim:** to discuss about the main mistakes in drafting the paper. Describe the Communication with the editorial board while submitting a paper.

**Questions:**

1. Case study. Find information about various types of mistakes in drafting the paper.
2. Find information about communicating with the editors when submitting an article about your experimental work.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Golard A. A field guide to thinking errors: Using neuroscience to classify, avoid, and exploit our biases. 2021, 260 pp.

4 Potochnik, A., Colombo M., Wright C. Recipes for Science, Taylor&Francis, 2019, 327 pp.

5 Meltzoff, J. and H. Cooper. Critical Thinking about Research (2-nd editon).APA (Amazon Kindle), 2018, 335 pp.

6 Rurherford, A. Critical thinkers:methods for clear thinking and analysis in everyday situations from the greatest thinkers in history. Amazon (Great of Kindle Edition), 2018, 173 pp.

**Internet resources**

**Laboratory work #9**

**Title:** Presenting a poster on a given issue.

**Aim:** to show the main criteria for designing a poster on a given issue.

**Questions:**

1. Make a list of requirements for the design of a poster on a given topic.
2. Show what problems the researcher might face with during the process of presenting a poster on a given problem.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Golard A. A field guide to thinking errors: Using neuroscience to classify, avoid, and exploit our biases. 2021, 260 pp.

4 Potochnik, A., Colombo M., Wright C. Recipes for Science, Taylor&Francis, 2019, 327 pp.

5 Meltzoff, J. and H. Cooper. Critical Thinking about Research (2-nd editon).APA (Amazon Kindle), 2018, 335 pp.

6 Rurherford, A. Critical thinkers:methods for clear thinking and analysis in everyday situations from the greatest thinkers in history. Amazon (Great of Kindle Edition), 2018, 173 pp.

**Internet resources**

**Laboratory work #10**

**Title:** Presenting scientific research.

**Aim:** to discuss the process of presenting scientific research and the correct preparation of presentation material.

**Questions:**

1. Depict the scheme of the presentation material of experimental work material.
2. Write an essay about the role of the correct preparation of thesis presentation.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Aytasheva Z.G. Concise Guidance for Biologists: Preparation of Scientific Publications and Grant Proposals. Kazakh University, 2005, 47 p. (Rus.). and later editions of this guidebook.

4 Dawkins R. The Oxford book of modern writing. 1st paper edition. Oxford University Press, 2009, 419 pp

**Internet resources**

**Laboratory work #11**

**Title:** Tips and rules of preparing an abstract for a conference

**Aim:** to discuss the differences between the protocols of preparing an abstract and short materials for a conference.

**Questions:**

1. Depict the structure of the protocols of preparing an abstract and short materials for a conference.

2. Describe the tips and rules of preparing an abstract for a conference.

3. Write an abstract or short materials about your experimental work for a conference.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Aytasheva Z.G. Concise Guidance for Biologists: Preparation of Scientific Publications and Grant Proposals. Kazakh University, 2005, 47 p. (Rus.). and later editions of this guidebook.

4 Dawkins R. The Oxford book of modern writing. 1st paper edition. Oxford University Press, 2009, 419 pp

**Internet resources**

**Laboratory work #12**

**Title:** Presentation of a work at the conference.

**Aim:** to discuss the types of presentation material at the conference.

**Questions:**

1. Find a suitable illustrative material of your research for the presentation at the conference.

2. Determine the most promising way to prepare presentation material at the conference.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Golard A. A field guide to thinking errors: Using neuroscience to classify, avoid, and exploit our biases. 2021, 260 pp.

4 Potochnik, A., Colombo M., Wright C. Recipes for Science, Taylor&Francis, 2019, 327 pp.

5 Meltzoff, J. and H. Cooper. Critical Thinking about Research (2-nd editon).APA (Amazon Kindle), 2018, 335 pp.

6 Rurherford, A. Critical thinkers:methods for clear thinking and analysis in everyday situations from the greatest thinkers in history. Amazon (Great of Kindle Edition), 2018, 173 pp.

**Internet resources**

**Laboratory work #13**

**Title:** Designing Ten Rules for Masters for successful accomplishment of the studies.

**Aim:** to discuss the rules of interview tactics.

**Questions:**

1. Make protocols describing gradually all steps and stages of your research for interview.
2. Describe the Ten Rules for Masters for successful accomplishment of the studies.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

**Internet resources**

**Laboratory work #14**

**Title:** Ten Rules principles in scientific reasoning Theme.

**Aim:** (continue) to discuss the principles of ten rules of scientific thinking topic. Listing online learning networks and commercialization web links for future master's studies.

**Questions:**

1. Describe the Ten Rules principles in scientific reasoning Theme.
2. Make lists of online learning networks and commercialization web links for future master's studies.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Aytasheva Z.G. Concise Guidance for Biologists: Preparation of Scientific Publications and Grant Proposals. Kazakh University, 2005, 47 p. (Rus.). and later editions of this guidebook.

**Internet resources**

**Laboratory work #15**

**Title:** Checking questions to lectures 8-14 (short tests).

**Aim:** to describe the prospects and limitations of scientific development. Test questions for lectures 8-14 (short tests).

**Questions:**

1. Describe the prospects and limitations of scientific development.
2. Answer the questions for lectures 8-14.

**Form of class:** offline

**Literature:**

1. Vaughn L. Concise Guide to Critical Thinking. 2-nd Edition, 2020, 368 pp.

2 Morrow D.R., Weston A. A Workbook for Arguments: A Complete Course in Critical Thinking 3-rd Edition, 2019, 563 pp.

3 Aytasheva Z.G. Concise Guidance for Biologists: Preparation of Scientific Publications and Grant Proposals. Kazakh University, 2005, 47 p. (Rus.). and later editions of this guidebook.

4 Dawkins R. The Oxford book of modern writing. 1st paper edition. Oxford University Press, 2009, 419 pp

**Internet resources**