Scientific Research Methods for STI

Introductory note

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General Description of the Program:

The course is delivered to master students of the National Research University Higher School of Economics (HSE). It is delivered in one module. The course length is **108** academic hours in total of which **32** hours are class room hours for lectures and **76** hours are devoted to self study.

Pre-requisites

- Basic knowledge of the scientific production process
- Interest in research activities

Course Objectives

- Understand research terminology
- Describe quantitative, qualitative and mixed methods approaches to research
- Individually exercise and manage literature review processes
- Critically analyze published research
- Identify and apply the concepts of variables, operationalization, causality, and hypotheses
- Understand the difference between quantitative, qualitative, and mixed methods and which research questions can be answered by the different methods
- Use theory and previous research to create research questions and hypotheses and to identify
- independently develop a coherent research proposal that includes an abstract, introduction, literature

Course Language: English.

Abstract

The course addresses the concepts and procedures of preparing research projects. The central learning objective is to equip students with the necessary skill-set to independently pursue and evaluate academic research. We will identify a clear research objective and understand the implicit and explicit research framework in which this objective is discussed. Consequently, the elaboration of the research questions and the definition and specification of the theoretical concepts used are dealt with. To do so, the course will break down the research process into

individual identified steps and discuss them in great detail. In general, the course will be an iterative process, by which its individual parts eventually will integrate in a coherent manner. Thereby, the students are familiarized with the existing academic traditions, such as providing proper credits and references. The course focuses on a deep understanding of philosophical assumptions of both qualitative and quantitative research methods. Students will be able to critically reflect on the implications that these assumptions have for the research objective, data collection, analysis, writing, and subsequent dissemination strategies.

1. Thematic Plan

a) lectures

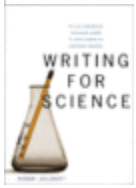
Topic	**Total academic hours**	**Lectures (class hours)**	**Self study**
Project design: developing question(s) & overall research approach	14	4	10
Research theories	14	4	10
Literature reviews	8	2	6
Literature search strategies	8	2	6
Quantitative research methods	14	4	10
Qualitative research methods	14	4	10
Reassembling the pieces: writing	8	2	6
Scientific presentation techniques	8	2	6
Dissemination strategies	14	4	10
Summary	6	4	2
Total	**108**	**32**	**76**

2. Basic literature

Scientific Writing : A Reader and Writer's Guide
Author: Lebrun, Jean-Luc
Publisher: World Scientific
Date Published: 2007

Scientific Writing : Easy When You Know How
Author: Peat, Jennifer Elliott, Elizabeth Baur, Louise
Publisher: BMJ Books
Date Published: 2002

Writing Science : Literacy and Discursive Power
Author: Halliday, M.A.K. Martin, J.R.
Publisher: Falmer Press
Date Published: 1996



Writing for Science
Author: Goldbort, Robert
Publisher: Yale University Press

3. Programme Content

Topic 1. Project design: developing question(s) & overall research approach

Topic outline:

- Who am I, and if yes, how many?
- What are possible results?
- Where do I start?
- And why is all of that so tricky?
- Structuring research work
- Developing research question and hypothesis

Main references/books/reading:

- Leburn, J. "Scientific writing: a reader and writer's guide" (2007), World Scientific Publishing, London.
- Holmes, F. L. "Scientific writing and scientific discovery." Isis (1987): 220-235.
- Williams, M. "Science and Social Science: An Introduction" (1999), Boulder, CO: Westview.

Topic 2. Research theories

Topic outline:

- Positivism
- Realism
- Constructivism
- Holistic methods

Main references/books/reading:

- Irwin, A., Michael, M. "Science, Social Theory and Public Knowledge" (2003), McGraw-Hill: Philadelphia.

Topic 3. The shoulders of the giant: literature review

Topic outline:

- What are the questions that make the world go round?
- Finding the niche for your own research
- Excerpt writing
- Literature summaries

- bibliographies

Topic 4. Literature search strategies

Topic outline:

- Structured vs. unstructured search strategies
- Databases and scientific search engines
- The white, the black, and the gray literature

Main references/books/reading:

- "How to undertake a literature search", slide set Manchester University
- Weiss, Newman "A guide to writing articles in energy science", Applied Energy, 2011.

Topic 5. Quantitative methods

Topic outline:

- Statistical analysis…
- …and what it cannot do

Topic 6. Qualitative methods

Topic outline:

- Interviews, case studies and ethnography…
- …and what it can do

Main references/books/reading:

- Krishnaswami, O.R. Satyaprasad, B.G., "Business Research Methods", (2010), Himalaya Pub. House.
- Gillham, B., "Case Study Research Methods", (2010), Bloomsbury Academic.

Topic 7. Reassembling the pieces: writing

Topic outline:

- Structuring scientific papers
- Requirements to scientific papers
- Abstract writing

Main references/books/reading:

- No reading required

Topic 8. Scientific presentation techniques

Topic outline:

- Structuring presentations
- Presentation styles
- Delivering messages
- Question & answer sessions

Main references/books/reading:

- No reading required

Topic 9. Dissemination strategies

Topic outline:

- Where to publish
- How to publish
- Why publishing at all?

Main references/books/reading:

- Leburn, J. “Scientific writing: a reader and writer’s guide” (2007). World Scientific.