Syllabus
Scientific Research Methods For Science, Technology And Innovation (1st year)
(3 ECTS)

 Approved by
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1. Course Description
The course is delivered to master students of the National Research University Higher School of Economics. It is delivered in one module. The course length is 114 academic hours in total of which 36 hours are class room hours for lectures and 78 hours are devoted to self-study.

   a. Pre-requisites
      – Basic knowledge of the scientific production process
      – Interest in research activities

   b. Abstract
The course addresses the design, preparation and implementation of research projects. The central learning objective is to equip students with the necessary skill-set to independently pursue and plan academic research. To do so, the research activities will be broken down into individual steps and discussed in detail. The course presents an iterative process, by which students will familiarize themselves with the core research processes and their coherent integration in the light of existing academic traditions, research designs and methodologies. It includes the understanding of philosophical assumptions of both qualitative and quantitative research methods. Students will learn to critically reflect on the implications that these assumptions have for the research objective, data collection, analysis, writing, and subsequent dissemination strategies.

   c. Course language
English
2. **Learning objectives**
   - Provide students with basic knowledge on preparation and implementation of research projects in STI.
   - Develop basic skill-set to independently pursue and plan academic research to be further developed at Research seminars running in parallel with the course.

3. **Learning outcomes**
   - Understanding research terminology
   - Understanding the difference between quantitative, qualitative, and mixed methods and which research questions can be answered by using them
   - Ability to use theory and previous research to create research questions and hypotheses
   - Abilities to identify and apply concepts of variables, operationalization, causality and indicators relevant for answering selected research question
   - Ability to independently develop a coherent research proposal

4. **Thematic Plan**
The course spans one academic module. The teaching is based on selected writings and experiences of faculty members. In addition, selected reputed scholars and experts are invited bringing together views from different perspectives on the meaning of social studies of science, technology and innovation to provide in-depth learning opportunities for all students.

Lectures are designed to deliver theoretical frameworks and international experiences. The course is accompanied by seminars, some sessions will feature additional foreign experts.

   **a. Lectures**
   **Topics:**
   - Research theories
   - Project design: developing question(s) & overall research approach
   - Literature work: searching strategies and review
   - Quantitative research methods
   - Qualitative research methods
   - Scientific presentation techniques

   **b. Seminars**
   Seminars consist of short practical sessions, group discussions and group work that will provide students indispensable abilities for developing main parts of their further research.

5. **Programme Contents**
   1. **Research theories**
      - Positivism
      - Realism
      - Constructivism
      - Holistic methods
Optional readings:


2. Project design: developing question(s) & overall research approach
   
   - 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

Optional readings:


3. Literature work: searching strategies and review

   - Structured vs. unstructured search strategies
   - Databases and scientific search engines
   - The white, the black, and the gray literature
   - Structuring scientific papers
   - Requirements to scientific papers
Optional readings:

4. Quantitative research methods
– Statistical analysis…
– …and what it cannot do

Optional readings:

5. Qualitative research methods
– Interviews, case studies and ethnography…
– …and what it can do

Optional readings:

6. Scientific presentation techniques
– Structuring presentations
– Presentation styles
– Delivering messages
– Question & answer sessions

No reading required

6. Grading system
The overall course grade $G$ (10-point scale) is calculated by the formula:

$$G = 0.6 \text{ RP} + 0.4 \text{ EX},$$

and includes results achieved by students in their research proposal ($RP$) and an exam ($EX$); it is rounded up to an integer number of points.

Summary Table: Correspondence of ten-point to five-point system’s marks

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<thead>
<tr>
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<tbody>
<tr>
<td>1 – unsatisfactory</td>
<td>Unsatisfactory – 2</td>
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<tr>
<td>2 – very bad</td>
<td>Satisfactory – 3</td>
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<tr>
<td>3 – bad</td>
<td></td>
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<tr>
<td>4 – satisfactory</td>
<td>Good – 4</td>
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<tr>
<td>5 – quite satisfactory</td>
<td>Excellent – 5</td>
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<tr>
<td>6 – good</td>
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<td>7 – very good</td>
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<td>8 – nearly excellent</td>
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<td>9 – excellent</td>
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<td>10 – brilliant</td>
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7. Course assignments

a. Research proposal ($RP$)

A piece of written work focused on a future (planned) study from three to five pages long implemented in line with the provided guidelines and answering the following criteria:

1) Aims and objectives – research question, aims and objectives are concisely elaborated. Significance emerges logically from construction of argument and clearly articulated.

2) Background and literature review – creative and organised literature review that outlines the background and context for the research project.

3) Methodology – creative and appropriate methodology is clearly articulated and justified.

4) Presentation – proposal is logical in its construction with minimal spelling, punctuation or grammatical errors. In-text and reference list consistently adhere to a single Author-date system throughout.

8. Examination type

Final exam ($EX$) is organized in a form of a colloquium – a home-prepared answers to a series of questions to be discussed at class in small groups within 120 minutes. A total of 2 questions are given (5 points per each). The grade is included in the $EX$, which weights 0.4 of final grade ($G$).
9. Methods of instruction

The course combines lectures and seminars through a participatory sessions and group work. Lectures are designed to clarify major theoretical concepts and international experiences employed in regional STI policy studies. Seminars are aimed at sharing the students’ reflections on the approaches introduced in the literature and developing analytical and practical abilities required to professionally discuss topics aroused during the course. The students are expected to be ready for discussions using the recommended readings and lecture materials.

10. HSE Library e-resources

HSE Library e-resources: https://library.hse.ru/en/e-resources

11. Software Support, including Open-Source Database Software

- Microsoft Windows 7 Professional RUS: internal university network (agreement)
- Microsoft Windows 10: internal university network (agreement)
- Microsoft Windows 8.1 Professional RUS: internal university network (agreement)
- Microsoft Office Professional Plus 2010: internal university network (agreement)

12. Special Equipment

Classrooms for lectures provide proper use and presentations of particular topics, specifically:

- PC with internet access and office software or laptop
- multimedia projector
- screen
- flipchart