HIGHER SCHOOL OF ECONOMICS
NATIONAL RESEARCH UNIVERSITY

The Federal Government Autonomous Institution of Higher Education
National Research University Higher School of Economics

International Laboratory for Applied Network Research

Master's Program: Applied Statistics with Network Analysis

Research Seminar: Theoretical and Methodological Aspects in Contemporary Statistics with Networks

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Office Hours:	TBD
Course website:	TBD

I. Course Summary

This course is a required research seminar for masters' students in "Applied Statistics with Network Analysis" program, designed to familiarize them with the general concepts and basic techniques of scientific research and writing process. The course is covered under several titles and will continue throughout the entire year, but the general guidelines will remain the same and are described in this document.

The students will become familiar with the terminology of research methods and methodology, the research process structure, and the publication requirements for papers submitted to scientific journals both in Russia and abroad. The distinguishing characteristic of this course is its emphasis on statistical and network studies – that is, research heavily rooted in advanced statistical methods. Moreover, this course is offered jointly with the NRU HSE International Laboratory for Applied Network Research (ANR), so students will become immersed in the work of the advanced research lab.

II. Field of application and normative references

The program of the course builds up the minimum requirements to the knowledge and skills of a student and determines the content and types of classes and assessment. The program is designed for instructors of this discipline, teaching assistants and students of the Master's program "Applied Statistics with Network Analysis." The program is developed according to:

• Educational standards of NRU HSE for the master's programs in "Applied mathematics and informatics" field, approved by HSE Scientific Council in December of 2017

• University Academic Plan of NRU HSE for Master level education, developed in 2014.

III. Course Description

This course is about conducting research, both in academia and in practice. Specifically, we will focus on basic steps of the scientific inquiry, starting with the topic selection, and progressing through to literature review, hypotheses generation, choice of analysis method, and methods of propagating the research results to wide audiences (written and oral presentations). Throughout the semester we will become familiar with the most advanced current topics, presented by guest speakers and the ANR researchers. Whether you plan to work in the corporate world, or develop your career in academia, you will be forced to generate knowledge and disseminate it to others, so there is no doubt that you will use the skills acquired in this course.

IV. Course Goals and Outcomes

a. The general objectives of the course are:
- To ensure that you understand topics, terminology, and principles of scientific research methods.
- To provide you with an understanding of the basic steps of the research process.
- To provide you with an overview of the most recent advances in network science and applied statistics
- To familiarize you with the requirements and guidelines of scientific publishing both in Russia and abroad.
- To help you continue developing your written and oral communication skills.

V. Students' Competencies to be Developed by the Course

The Course develops the following competencies

Competencies	NC/NRU-HSE Code	Descriptors - the learning outcomes (the indicators of achievement)	Teaching forms and methods of that contribute to the development of a competence
Systemic Competencies			
1. Ability to reflect (evaluate and reprocess) studied scientific methods and techniques of professional activity.	СК-1	Can evaluate and reprocess methods and techniques of contemporary data analysis with networks for a given problem.	Lectures, readings, in-class exercises, data analysis projects
2. Ability to create new theories, invent new techniques and tools of professional activity.	СК-2	Can use their knowledge in contemporary data analysis with networks to create new theories, invent new techniques and tools of professional activity.	Lectures, readings, in-class exercises, data analysis projects
3. Ability to independently learn new research methods, change the scientific and production profile of their activity.	СК-3	Can use new methods and techniques of contemporary data analysis with networks, additional packages and tools, without direct	Lectures, readings, in-class exercises, data analysis projects

Competencies	NC/NRU-HSE Code	Descriptors - the learning outcomes (the indicators of achievement)	Teaching forms and methods of that contribute to the development of a competence
		supervision.	
4. Ability to analyze, verify, evaluate the completeness of information in the process of their professional activities, to replenish and synthesize missing information, if necessary.	СК-5	Able to analyze, verify, evaluate the completeness of information, can integrate information found from various sources and compensate for lack of data by adjusting models.	Lectures; independent work.
5. Ability to build professional activity and business, make choices, guided by the principles of social responsibility.	СК-7	Can build professional activity, business, and make choices on the principles of social responsibility.	Lectures, readings, in-class exercises, data analysis projects
6. Is able to conduct a professional, including scientific and research activities, in the international environment.	СК-8	Can conduct professional, including scientific and research activities, in the international environment. Concisely and precisely expresses research ideas in English in written and oral communication.	Lectures, readings, in-class exercises, data analysis projects
Social and Personal Competencies			
7. Ability to use social and multicultural differences to solve problems in professional and social activities.	ПК-3	Can effectively solve problems in professional and social activities.	Lectures, in-class exercises, data analysis projects
8. Ability to consciously choose strategies for interpersonal interaction.	ПК-5	Is capable to choose effective strategies for interpersonal interaction with peers, instructors, and general audience.	Lectures, readings, in-class exercises, data analysis projects
9. Ability to generate fundamentally new ideas and products, to hold creativity and initiative.	ПК-8	Can effectively generate new ideas and products in their professional activities.	Lectures, readings, in-class exercises, data analysis projects
Instrumental Competencies			

Competencies	NC/NRU-HSE Code	Descriptors - the learning outcomes (the indicators of achievement)	Teaching forms and methods of that contribute to the development of a competence
10. Ability to organize scientific and research activities.	ПК-9	Is capable to organize scientific and research activities without direct supervision.	In-class exercises, data analysis projects
11. Ability to produce interdisciplinary texts using the language and apparatus of applied mathematics.	ПК-11	Produce interdisciplinary texts (works, articles) using the language and apparatus of applied mathematics.	Lectures, readings, in-class exercises, data analysis projects
12. Ability to describe problems and situations of professional activity using the language and apparatus of applied mathematics in solving interdisciplinary problems.	ПК-14	Can use the language and apparatus of applied mathematics in solving interdisciplinary problems when describing problems and situations of professional activity.	Lectures, readings, in-class exercises, data analysis projects
13. Ability to build and solve mathematical models in accordance with the profile of training and specialization.	ПК-17	Can build and solve mathematical models without direct supervision, and is capable of using these methods to analyze complex models.	Lectures, readings, in-class exercises, data analysis projects
14. Ability to solve the tasks of professional activity as a part of the research and production team in accordance with the profile of training, to communicate with experts in other subject areas.	ПК-19	Can solve different tasks of professional activity. Effectively communicate with experts from other areas.	Lectures, in-class exercises, data analysis projects
15. Ability to apply modern programming and data manipulation languages, operating systems, electronic libraries and software packages, network technologies, etc. in research and applied activities.	ПК-20	Is capable to apply modern programming and data manipulation languages, operating systems, electronic libraries and software packages, network technologies, etc. in research and applied projects.	Lectures, readings, in-class exercises, data analysis projects

VI. Format and Procedures

This course will emphasize preparation for each class period and will involve a high level of class participation. Often, experiential exercises, simulations, and video segments (methodological course webcasts) will be used to illustrate key concepts. Throughout the course, students will be required to write a research paper following the guidelines given in class, with incremental parts assigned every week based on the topic covered. In addition, specific readings and examples will be used to augment the lecture and to stimulate class discussion. Very little lecture time will be devoted to topics that the average student can readily comprehend on the basis of self-study. **Please remember that learning to write a paper starts with reading many good papers. Therefore, preparation for every class is essential to your success in this course.** The instructional approach will emphasize cooperative learning and will tend towards an environment in which students will feel comfortable sharing their interaction with, and learning of, the course materials.

Course progression

This course is fluid and dynamic, and we will have to learn to adjust to schedules of invited speakers. Some topics will be assigned well in advance; others – a few days before class (sometimes as late as the class before). Keep up on top of the assignments by attending every class, checking your readings folder frequently, and keeping in touch with the instructor. Though each topic is expected to be stand-alone, it is advisable that you don't miss any lectures or assigned work, as topics build on each other to create a cohesive overview of the research and writing process. You will be advised in advance of any course flow changes.

Messages and Memos for Me

If you have any messages or specific requests for me, please submit them by e-mail to vkuskova@hse.ru ONLY. I will not respond to emails sent to any other address Ensure that your message includes your name, a complete description of your concern, and a recommendation for resolution.

Stay Informed about Class Schedules & Policies

It is the student's responsibility to stay informed about class schedules and policies. The information you need is included in the MASNA student resources. In addition, announcements will be made regularly in class and on website, and it is your responsibility to keep up with that information. If you are unclear about any policies or other information, please ask promptly. Don't wait and get an unpleasant surprise later.

Participation Ground Rules

In an effort to provide a classroom environment as conducive to learning as possible, the following ground rules should be observed:

1. *Confidentiality*. Concepts and ideas can be taken from the class and discussed freely. However, personal stories or issues raised by individuals are to be kept confidential and as the property of the class.
2. *Respectful Listening*. When differing with another participant's point of view, listen first before raising questions. When another participant raises a point we disagree with or find offensive, it is important to remember that the human being behind that question or comment deserves respect. Please freely utilize the concepts we'll learn in the second week of class.
3. *Participation*. Participants who tend to be quieter are encouraged to contribute to enhancing the learning process by sharing their perspectives and experiences. Those who are aware they are prone to monopolizing discussions are encouraged to self-monitor their behavior and make room for quieter students.
4. *No Zaps*. In keeping with the notion of respectful listening, "putting-down" others in class is discouraged. "Zapping" another person often serves to discourage open and honest exchange of ideas among the whole group.

Homeworks

In this class, homeworks are essential for learning. As Arnold Schwarzenegger once put it, "Nobody ever got muscles watching me lift the weights!" In a similar manner, simply reading good articles is not enough – you also have to practice your writing skills, and improve on your style by getting feedback for your writing. Homeworks will be assigned as needed, and are always due on the day of class the following week.

Homeworks and Projects must be turned in by midnight of the due date. All work is due by 23:59 pm; work submitted at 12:01 am (1 minute past due date) or later is considered late. Due dates for all homeworks are one week after they are handed out, on paper in class, or by midnight electronically.

Copyright Notice

All handouts in this course are copyrighted, including all materials delivered electronically. "Handouts" refers to all materials generated for this class, which include but are not limited to the syllabus, class notes, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. You have the right to download materials from the course website for your own use during this class; however, because these materials are copyrighted, you do not have the right to copy the handouts for other purposes unless the instructor expressly grants permission.

Class preparation

Considering that class preparation is a personal matter and that there is no one formula, the following are some generally recommended guidelines for most cases:

1. Read the assigned material quickly, noting the major issues and a general sense of the layout. Read to get a sense of what the reading is about. Ask yourself how you can relate to the materials covered, and whether all the new terms make sense.
2. Reread the material carefully, annotating, highlighting and distinguishing important information, omissions, and questions raised by the reading.
3. Decide what the most important issues are. Write down questions you don't understand.
4. Discuss the reading with others, before class if possible, to test out your ideas and further your understanding of the issues.
5. Prepare notes to guide your class participation, including: answering assigned questions, summary of the main issue(s), further questions raised by the reading, assumptions made by the chapter, your personal experiences, and possible approaches or solutions to any problems assigned with the material.
6. Always do the assigned homework.

VII. Assumptions

We expect you to have a solid command of the English languages, enough to read and comprehend academic literature and follow the writer's style. We also expect you to have solid writing skills at a level sufficient for writing complex academic papers. It will be very difficult to succeed in this class otherwise.

VIII. Course Requirements

a. Class attendance and participation policy

You are responsible for attending class. If you miss class, you are still responsible for everything covered in class, including announcements. Absences excuse you (the body) NOT ANY WORK THAT

IS DUE, even if excuse is documented. Failure to turn in assignments on time will result in a loss of participation/responsibility points, and a zero on the assignment. Similarly, being absent does not excuse you from obtaining handouts and assignments that you may have missed. It is your responsibility to find out what you have missed and to make arrangements to obtain any handouts, assignments, etc. If you are going to be absent or late, then make sure you e-mail or have someone deliver your homework. All work is due before class begins. Exception: religious observance absences as stated below.

When will an excuse be counted as documented? Documented excuses must include: your name, the date(s) of your absence, the reason for the absence, the (legible) name of the person authorizing the excuse, and his/her phone number for verification. If the excuse is for an illness, the date you are allowed to return to school should be included. The excuse must cover the date(s) of your absence. I reserve the right to check excuses for authenticity. Attempts to use forged or invalid excuses will be treated as a case of scholastic dishonesty (See Academic Honesty, below). Please provide documentation of any excused absences within two class periods of returning to class. Please do not wait until the end of the semester to do so; I will reserve the right to refuse any documented excuses submitted to me outside the four-class window.

Why should you bother to attend every class? Most of the new material in this course is introduced and explained IN CLASS. You can't learn if you are not there.

Make-up policy

I allow you to drop one lowest grade on homeworks, so no make-ups will be allowed. Exception: religious observances absences as stated below.

Religious Observance

Accommodations will be made for observance of religious holidays, if they are not scheduled as university-wide holidays. I require that you request accommodations in advance, in writing, clearly stating the date(s) of absence, or tasks that you are unable to complete because of religions restrictions (e.g., inability to use technology). Requests for accommodations must be submitted to me no later than Monday of the 2nd week of classes at class time.

b. Course readings:

Please note: whenever possible without violating copyright restrictions, reading materials will be provided in printed or electronic format. There is no textbook for the course; all literature required for reading is provided in the course schedule with assignments for every lecture.

Supplemental Literature

In addition to the literature required for every class (and listed in the course schedule), the list below contains supplemental papers and books that you may find helpful in mastering the subject matter.

1. Aronson, E., Ellsworth, P.C., Carlsmith, J.M., & Gonzales, M.H. (1990). *Methods of research in Social Psychology (2nd ed.).* New York: McGraw-Hill.
2. Babbie, E. (1989). *The Practice of Social Research.* (5th ed.) Belmont: Wadsworth Publishing.
3. Bordens, K.S. & Abbott, B.B. (1991). *Research Design and methods: a process approach.* (2nd Ed.). California: Mayfield Publishing Company.
4. Bryman, Alan. (1992). *Research methods and organization studies.* London: Routledge.
5. Cook, T.D. & Campbell, D.T. (1979). *Quasi-experimentation: Design & Analysis issues for field settings.* Boston, MA.: Houghton-Mifflin.
6. Campbell, J.P., Daft, R.L., & Hulin, C.L. (1982). *What to study: Generating and developing research questions.* Beverly Hills: Sage.

7. Churchill, G.A., Jr. (1991). *Marketing research: Methodological foundations* (5th Ed.). Orlando, FL: Dryden Press.
8. Judd, C.M., Smith, E.R., & Kidder, L.H. (1991). *Research methods in social relations.* (6th ed.) Chicago: Holt, Reinhart and Winston.
9. Rosnow, R.L., (1981). *Paradigms in transition: The methodology of social inquiry.* New York: Oxford University Press.
10. Salsburg, D. (2001). *The lady tasting tea: How statistics revolutionized science in the twentieth century*. W.H. Freeman Co.
11. Schwab, D.P. (1999). *Research methods for organizational studies.* Mahwah, NJ: Lawrence Erlbaum.
12. Webb, E.J., Campbell, D.T., Schwartz, R.D., & Sechrest, L. (1966). *Unobtrusive Measures: Nonreactive research in the social sciences.* Chicago: Rand McNally.
13. Радаев В.В. *Как организовать и представить исследовательский проект: 75 простых правил.* М.: ИНФРА-М, 2001.
14. Эко У. *Как написать дипломную работу. Гуманитарные науки*. М.: Книжный дом «Университет», 2003. Выбор темы диплома.
15. Ядов В.А. *Стратегия социологического исследования. Описание, объяснение, понимание социальной реальности*. – М.: Омега-Л, 2007.
16. *Методологические проблемы социологического исследования мобильности трудовых ресурсов*. Отв. ред. Заславская Т.И., Рывкина Р.В. – Новосибирск: наука, 1974.
17. ГОСТ 7.1-2003. *Библиографическая запись. Библиографическое описание. Общие требования и правила составления*. – М.: Изд-во стандартов, 2004.
18. Кузин Ф.А. *Магистерская диссертация. Методика написания, правила оформления и порядок защиты. Практическое пособие для студентов-магистрантов*.- М., 2008.

IX. Grading Procedures

a. <u>Course assignments and projects:</u>

Assignments	Percent of Grade
#1: Weekly homeworks	50%
#2: In-class presentations	10%
#3: Participation and responsibility grade	20%
#4: Final Paper	20%

Weekly assignments: Homework will be assigned as needed. Usually it will consist of a short research report, or, as semester progresses, incremental improvements to your research paper. You will be notified of an upcoming homework at least a week in advance.

In-Class presentations: you are expected to do at least two presentations during the semester. The first one is presenting someone else's work: for example, I may ask you to do a short summary of a paper we will be discussing in class and present your review. The second is presenting your own research ideas, and these presentations will be scheduled towards the end of the semester.

Participation and responsibility grade: we all are expected to help each other learn. Therefore, there will be short assignments, such as providing presentations feedback to each other, that you will get points for. Usually I will grade them on "banana/non-banana" principle, unless otherwise specified. In order to

participate, you have to be present in class; all points for this part of the grade are earned through in-class participation.

Final Paper: you will need to select one of the tracks, academic or practical, for your work in this seminar. Your final paper, which you submit at the end of the semester, will be either the academic research article or the consulting project report (or at least, a wannabe of either). The task is to show me whether you've learned how to incorporate theoretical material we cover in this seminar into your written work.

X. Academic Integrity:

a. Each student in this course is expected to abide by the Higher School of Economics' Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. As this course requires lots of writing, it is **mandatory** that no part of your work be copied from other sources without being taken in quotes and properly documented. Documentation of the cited literature is an essential skill learned in this course.

b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e-mail, an e-mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.

XI. Accommodations for Students with Disabilities

NRU Higher School of Economics is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodation

XII. Course Schedule

The topics to be covered in course, with assigned readings and corresponding assignments, are provided in a separate document and are subject to change throughout the semester. Please check your seminar folder frequently. The dates are not fixed, but it is expected that we will be moving at the rate of a topic (or one part for two-part sequences) per week. In the event that we are progressing faster or slower, you will be notified of all the changes in advance.

Course Schedule is subject to change with notice.