

## Research project

### Course Syllabus

**This course contributes to the requirements for the Degree of MSc in Computer Science**

<b>Title of the Academic Program</b>	Master's Degree Program Digital intelligent control systems (delivered in English)
<b>Type of the course</b>	core /mandatory
<b>Course period</b>	3 semester from October, the 1st to February, the 1st (18 weeks)
<b>Study credits</b>	3 ECTS credits
<b>Duration</b>	108 hours
<b>Language of instruction</b>	English
<b>Academic requirements</b>	BSc degree in Computer Science or equivalent (transcript of records), good command of English (an examination certificate or another formal document) Possess: Language skills, Professional Communication

### Course Overview

#### Description

“Research project” is a core course.

"Research Project" is the second stage of work on a master's thesis. During this course, students gain experience in the field of intellectual property and research ethics. They conduct patent searches and analyze related works to study the current state of the target area. Work on the “Research Project” is carried out on the basis of the research and training laboratories of the School of Space and Information Technologies or in other schools of the Siberian Federal University and the Scientific Library of the Siberian Federal University and in close cooperation with the student's scientific supervisor.

**The aim** of the "Research Project" is to prepare for the implementation of the Final Project and for master’s thesis defense. It includes finding or developing methods and tools to solve a stated problem, taking into account the latest research and trends; clarification of requirements for the object under development; planning experiments and tests to prove the effectiveness of the proposed solution.

## **Special Features of the Course**

This activity is carried out using open sources, as well as scientific journals and databases available through the Scientific Library of the Siberian Federal University. The Scientific Library of SibFU is one of the main structural units of the university, providing high-quality information support of educational process and research. The work on the Research Project is carried out on the basis of research and educational laboratories of microprocessor systems, computer networks and telecommunications, software development technologies.

## **Course Objectives**

The objectives of the course are:

- to provide students with the opportunity and support to improve their self-study skills using modern information technologies and apply new knowledge and skills in practice, including in new areas;
- to raise student's awareness in advanced methods of research and mastering the skills to apply them;
- teach students to find and critically analyze sources of information;
- develop their ability to build a logic of reasoning and statements based on the interpretation of data combined from various fields of science and technology, to make judgments based on incomplete data;
- improve the student's academic writing experience.

## **Learning Outcomes of the Course**

By the end of the course, students will know:

- fundamental concepts and categories in the field of scientific research
- ways of organizing and planning research
- relevant information sources that allow him or her to acquire new knowledge and skills in various fields
- advanced information technologies allowing to acquire new knowledge in various fields
- features of the technical and scientific style of writing texts
- basic concepts of the culture of thinking, logic, rules for constructing reasoning and statements
- formal apparatus of the logic of constructing reasoning and statements
- evaluation criteria and methods of handling incomplete data

By the end of the course, students will be able to:

- formulate the goals and objectives of scientific research;
- search, evaluate and analyze information about the achievements of science and technology in the target area and beyond;
- interpret data from different fields of science and technology;
- to build the logic of reasoning and statements;
- write a text in a scientific or scientific and technical style, use the appropriate vocabulary;
- create, design and edit text documents in accordance with the requirements of the organization or publisher;
- plan a pilot study.

By the end of the course, students will possess:

- methods of planning scientific research, taking into account the peculiarities of the professional area;
- methods of collecting and analyzing information on the achievements of science and technology in the target area and beyond;
- proficiency in preparing publications on the topic of research
- experience in data integration from different fields of science and technology and building evidence-based judgments;
- methods of planning an experiment, taking into account the peculiarities of the field of professional activity.

### Course Structure

Learning Activities	Hours
Seminars	18
Assignments	90
<b>Total</b>	<b>108</b>

## Course Outline

Week	Seminars/ Assignments	Hours Seminar/HA
1. 1-2	Introductory lesson: clarification of the project topic, analysis of the assignment.	2/2
2. 3-4	The structure of scientific texts: abstract, article, presentation, research report, master's thesis.	2/10
3. 5-6	An analytical review on the research topic, its goals and objectives. Related works. Sources of information: open sources, journals, databases and collections of publishers. Citation rules. Scientific ethics. Plagiarism. Presentation and discussion of an in-depth analytical review on the research topic.	2/10
4. 7-8	Scientific novelty. Intellectual property. Patent search: goals and objectives, patent databases, rules for compiling a patent search report.	2/10
5. 9-10	Critical analysis of the related works. Identification and evaluation of methods used by other researchers. Choosing or developing your own method, its rationale.	2/10
6. 11-12	Research Design Stage: clarification of the requirements for the object being developed (software, hardware and software system, technical product).	2/10
7. 13-14	Formulation of criteria for the project goal achieving. Determination of ways to confirm the achievement of the set goal. Experimental study of the object under development. Experiment planning.	2/10
8. 15-16	Preliminary report on the Research Project. Discussion of the preliminary results of the project. Recommendations for improvement and revision.	2/10
9. 17-18	Final assessment: Project defense in the form of a presentation	2/10
<b>Total</b>	<b>18</b>	<b>18/90</b>

## Course Instructor and Tutor, Contact information



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Google Scholar:

<https://scholar.google.ru/citations?user=qPHGN3cAAAAJ&hl=ru>

Additional information is available at:

<http://structure.sfu-kras.ru/node/2043#main>

## Assessment

Evaluation strategy	Points, max	Evaluation criteria
Seminar activity	25	Participation in a seminar is rated on a pass/fail scale.  To pass a seminar, the student have to be present and active during the lesson (in the classroom or online).
Analytical review	25	Review of related works that summarizes the major approaches that have been used to date to address a research project topic
Patent search report	25	The Patent Search Report that provides an overview of patents or other intellectual property items according to the theme of the research project.
Presentation	25	Each participant will prepare a report and a 10-minute presentation that describes: (i) the nature and background of the research problem; (ii) results of the patent search (iii) a rationale for the methods chosen by the student to approach the problem; (iiii) evaluating criteria and plan of an experimental study of the developed object.

Grading policy for final assessment is:

- A (excellent work) 91–100 points
- B (above average) 81–90 points
- C (average) 71–80 points
- D (below average) 50–70 points
- F (failed) < 50 points

## Attendance Policy

The course is designed to use e-learning and distance learning technologies. The course can be implemented in two versions: classroom lessons or distance learning.

If the course is implemented as classroom lessons, students are expected to attend classes regularly. In case of missing an in-lab activity a student should perform additional work submitted to the instructor within a week after a class was missed.

If the course is implemented in a distance format:

1. It is recommended to attend online seminars. If a student skips an online seminar, he or she should pass the e-course element "Lecture with test questions" on the relevant topic.
2. Timely submissions of work reports are anticipated. If the work is not completed on time, you must contact the teacher through the e-course message indicating the reason for the delay and the estimated deadline. No more than 3 postponements are allowed.
3. Participation in the following events held in the format of videoconferences is mandatory:
  - Preliminary report on the course project.
  - Final assessment: Project defense in the form of a presentation.

Those events can only be rescheduled for good reason.

## Web page of the course

Course materials and required reading materials are available on the webpage of the course Research Project Management Link: <https://e.sfu-kras.ru/course/view.php?id=8803>, SibFU E-learning portal, [www.e.sfu-kras.ru](http://www.e.sfu-kras.ru) . You must be logged in to access this course.

## Core reading

1. Kennett, B. (2014). Planning and managing scientific research. ANU Press. <https://www.jstor.org/stable/j.ctt6wp816> (free access)
2. Sirotinina, N. (2012). History and methodology of computer science. Siberian Federal University. Tomsk: TPU Publishing House.
3. Moore, N. (2006). *How to do research: a practical guide to designing and managing research projects*. Facet publishing.
4. Zina, O. (2021). *The essential guide to doing your research project*. Sage.
5. Hopkins, D. K. (2001). The seven steps: Basic novelty patent searching. *Science & Technology Libraries*, 22(1-2), 23-38.
6. Reingand, N. (Ed.). (2011). *Intellectual Property in Academia: A Practical Guide for Scientists and Engineers*. Crc Press. Reingand N. (ed.). Intellectual

## **Facilities, Equipment and Software**

Software:

- Internet access
- MS Office or Libra Office

Equipment:

- PC