**THE RESEARCH SEMINAR**

**1 GENERAL CHARACTERISTICS OF THE RESEARCH SEMINAR**

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| 1. Prerequisites | Research methodology |
| 2. Corequisites | The theory of automata and formal languages  Discrete mathematics and mathematical cybernetics |
| 3. Postrequisites | - |
| 4. Work input of the discipline module, credits | 3 |

**1.1. Key objectives of the research seminar for Ph.D. students are**

* to study the basics of how to arrange for a research seminar at the chairs and/or scientific schools,
* to develop practical skills in the exchange of scientific information,
* to enhance motivation for research work,
* to generate skills in order to perform the functions of a researcher,
* to acquire new scientific knowledge in discrete mathematics,
* to acquire the skills of working in a research team.

The participation in research seminars is aimed at generating the competencies among Ph.D. as follows,

* the ability to critically analyse and evaluate current scientific achievements, generate new ideas in solving research and practical problems, also in inter-disciplinary areas (Universal Competence-1);
* readiness to participate in the work of Russian and international research teams in solving research and academic problems (Universal Competence-3);
* readiness to use contemporary methods and technologies of scientific communication in the state and foreign languages (Universal Competence-4);
* the ability to plan and solve their own professional and personal development problems General Professional Competence-5);
* the ability to independently carry out research activities in the relevant professional field using modern research methods as well as information and communication technologies (General Professional Competence-1);
* the ability to professionally communicate your research outcomes and present them in the form of scientific publications, information and analytical materials and presentations (General Professional Competence-3);
* understanding the role and place of discrete mathematics and mathematical cybernetics in mathematics in general, their connection with other branches of mathematics and other fields of science (Professional Competence-1);
* the ability to apply and build independently effective algorithms for solving discrete problems (Professional Competence-2);
* the ability to evaluate the computational, descriptive and combinatorial complexity of algorithms, tasks and formal languages (Professional Competence-3);
* the ability to build mathematical models of the discrete processes with graphs, matroids, automata and logical formulas (Professional Competence-4);
* the ability to apply algebraic, logical, combinatorial, probabilistic and algorithmic methods for analysing graphs, automata, formal languages and character sequences (Professional Competence-5);
* the ability to put a computer experiment to advance, confirm or disprove scientific hypotheses (Professional Competence-6).

**1.2 Practice outcome requirements**

Participation of .D.students in a research seminar should result in obtaining:

* the information on making arrangements for research in a higher educational institution,
* the information on making arrangements for sharing research information,
* a holistic view of the research activities, research teams and the scientific society structure in a higher educational establishment;
* the sustainable skills of practical communication in a research team;
* the professional research orientation;
* the information about real problems and problems tackled by the seminar research teams;
* the developed personal and professional qualities of a researcher.

Ph.D.students should **know**

* the research communication methods, techniques and technologies;
* the main achievements and trends in the development of discrete mathematics and its relationship with other sciences;
* the modern research activity modelling concepts;
* the basis of scientific and methodological work in higher education;
* the procedure for organising, planning, maintaining and providing research activities with the latest technologies;
* the basis of scientific culture and mastery;
* the basic principles, methods and forms of the research process organisation at the university;
* methods for monitoring and evaluating the quality of research outcomes;

**be able:**

* to use the scientific communication technologies, methods and techniques;
* to use modern technical aids when presenting the research results;
* to use computer technology and information technology in scientific communication;
* to use the computer technology and information technology basics in research activities;
* to be involved in the research activities in a research team;

**have the skills of:**

* the methods of using technical aids in the conduct of research;
* the verbal and written scientific speech techniques;
* the registration of the research outcomes by using the modern computer technologies;
* the methodology of self-evaluation and self-examination of the research results and their effectiveness.

**1.3. Research seminar premises**

The research seminar premises are the Chair of Algebra and Discrete Mathematics of the Institute of Mathematics and Computer Science of UrFU. The of Ph.D. student.

General guidelines to the graduate student during his/her participation in the research seminar is provided by the scientific supervisor.

**2. RESEARCH SEMINAR PARTICIPATION CONTENTS**

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| **Section code** | Section of participation in the work | Contents |
| Р1 | **Organisational aspects of the research activities in the seminar** | Introduction into the research seminar activity arrangements.  Insight into the research seminar development history.  Studying various literature on the problems of scientific creativity.  Insight into the research activity subjects of the seminar.  Drawing up in individual plan of participation in the seminar. |
| Р2 | **Active participation in the seminar activities** | Preparation for abstract scientific presentations at the seminar.  Preparation for scientific speeches on their own research at the seminar.  Preparation of materials for the presentations of own research outcomes.  Presentations at the seminar including speeches on their own research outcomes.  Hearing speeches and reports of other seminar participants.  Participation in the discussion of speeches and reports presented at the seminar.  Preparation for drawing up a report on participation in the seminar. |

The content of the R Ph.D. student’s participation in the research seminar is determined taking into account the interests and possibilities of the chair where it is conducted, and is completely determined by the individual task. The individual task is developed taking into account the area of the postgraduate training programme and taking into account the subjects of the research work of the Ph.D. student.

**3. DISTRIBUTION OF THE LABOUR INTENSITY IN MASTERING THE DISCIPLINE BY SECTIONS AND CONTROL ACTIVITIES**

(intramural form of study)

Learning semester 3, 4, 5, 6, 7, 8 Scope of discipline (credits) 1,1,1,1,1,1 Total: 6

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| Discipline section | | | In-class load  (hours) | | | | Type, quantity and volumes of activities | | | | | | | | | | | | | | | | | | | | |
| Code of section, topic | Name of section, topic | Total of section, topic (hours) | Total | Lectures | Practical exercises | Laboratory-based work | Preparation for in-class learning (hours) | | | | | Total (hours) | Performing independent extracurricular activities (quantity) | | | | | | | | | Total (hours) | Preparation for the control qualification activities (quantity) | | | | |
| Total | Lectures | Pract. seminar classes | Laboratory-based work | Research seminars, conference seminars and colloquiums | Homework\* | Graphical work\* | Research paper, essay, creative work\* | Individual or group project\* | Translation of foreign literature\* j | Calculation wok, programme development\* | Calculation and graphical work\* | Term paper/ multi-disciplinary term work\* | Term paper/ multi-disciplinary term project\* | Review work (test)\* | Colloquium\* | Credit/test\* (given there is an exam) | Credit/test\* (graded given there is no exam) | Exam\* |
| **P1** | **Organisational aspects of the research seminar activities** | 36 |  |  |  |  |  |  |  |  |  | 36 |  |  |  | 36 |  |  |  |  |  |  |  |  | 4 | | |
| **P2** | **Active participation in the seminar** | 30 | 54 |  | 54 |  |  |  |  |  |  | 126 |  |  |  | 126 |  |  |  |  |  |  |  |  |
|  | **Discipline, total (hours)** | **216** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 4 | | |

**4. Self-guided work of Ph.D. students**

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| List of tasks for the self-guided work | Work intensity | |
| hours | credits |
| Introduction to the organization of the activities of the research seminar. | 4 |  |
| Introduction to the history of the formation of the research seminar. | 6 |  |
| Familiarisation with the theme of the scientific activity of the seminar. | 22 |  |
| Drawing up an individual plan for participation in the research seminar activities. | 4 |  |
| Total | 36 | 1.9 |
| Preparation for abstract scientific presentations at the seminar. | 20 |  |
| Preparation for scientific reports on their own research at the seminar. | 40 |  |
| Preparation of materials for presentations of own research outcomes. | 20 |  |
| Presentations with reports and presentations at the seminar, including speeches on their own scientific research. | 12 |  |
| Hearing the speeches and reports of other seminar participants. | 62 |  |
| Participation in the discussion of speeches and reports presented at the seminar. | 20 |  |
| Preparation for the report on participation in the seminar. | 6 |  |
| Total | 180 | 5.0 |

**5. Reporting on the research seminar outcomes**

A Ph.D. student is assessed by the chair of algebra and discrete mathematics based on the presentation of the feedback from the practice leader. The main basis for the attestation of a post-graduate student is his/her active participation in research seminars.

**6.3. Databases, information and reference systems and search systems**

1. The official Internet portal of legal information. – Available at http://pravo.gov.ru/, free. – Title from the screen.
2. Portal of the UrFU information and educational resources. - Available at http://study.nrfn.ru/info/, free. - Title from the screen.
3. Electronic base of regulatory documents of GOSTEXPERT. - Available at http://gostexpert.ru/, free. - Title from the screen.
4. Search engines: www.yandex.ru, google.ru, www.rambler.ru,