Правительство Российской Федерации

Федеральное государственное автономное образовательное учреждение высшего профессионального образования "Национальный исследовательский университет «Высшая школа экономики»"

Программа дисциплины “Academic Writing (and Typ[esett]ing)”

для направления 09.06.01 «Информатика и вычислительная техника»,
профили 05.13.01 «Системный анализ, управление и обработка информации», 05.13.11 «Математическое и программное обеспечение вычислительных машин, комплексов и компьютерных сетей», 05.13.17 «Теоретические основы информатики», 05.13.18 «Математическое моделирование, численные методы и комплексы программ»
подготовки научно-педагогических кадров в аспирантуре

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Одобрена на заседании Академического совета аспирантской школы по компьютерным наукам
«26» октября 2014 г.

Москва – 2014

1. Scope of Use

This program establishes minimum requirements to postgraduate students' knowledge and skills for 09.06.01 Computer Science and Computer Engineering / 05.13.01 “Systems Analysis, Control Theory, and Information Processing”, 05.13.11 “Mathematical Theory and Software for Computing Machinery, Systems, and Networks”, 05.13.17 “Theoretical Foundations of Computer Science”, 05.13.18 “Mathematical Modeling, Numerical Methods, and Software Systems” and determines the content of the course and educational techniques used in teaching the course.

The present syllabus is aimed at faculty teaching the course and postgraduate students studying 09.06.01 Computer Science and Computer Engineering / 05.13.01 “Systems Analysis, Control Theory, and Information Processing”, 05.13.11 “Mathematical Theory and Software for Computing Machinery, Systems, and Networks”, 05.13.17 “Theoretical Foundations of Computer Science”, 05.13.18 “Mathematical Modeling, Numerical Methods, and Software Systems”.

This syllabus meets the standards required by:

- Educational standards of the National Research University Higher School of Economics;
- Postgraduate educational program for 09.06.01 Computer Science and Computer Engineering;
- University curriculum of the postgraduate program for 09.06.01 Computer Science and Computer Engineering / 05.13.01 “Systems Analysis, Control Theory, and Information Processing”, 05.13.11 “Mathematical Theory and Software for Computing Machinery, Systems, and Networks”, 05.13.17 “Theoretical Foundations of Computer Science”, 05.13.18 Mathematical Modeling, Numerical Methods, and Software Systems”, approved in 2014.

2. Learning Objectives

The course “Academic writing (and Typ[esett]ing)”, offered to Ph.D. students of the Graduate School in Computer Science, consists of two main parts.

The first part, Academic Writing proper, is aimed at mastering basic principles of mathematical and scientific exposition, understanding the role of Mathematical Rigor, Notation and Style both in popular and specialized texts such as mathematical papers, overviews, lecture notes, and dissertation theses.

The second part, Academic Typesetting, is aimed at grasping the principles and techniques of efficient communication of research results through the LaTeX document preparation system. A certain proficiency in TeX programming is presumed, and the emphasis is made on the specific document classes in current use, as well as proper style and best practices of preparing large documents in LaTeX. The Russian system of standards regarding preparation of Ph.D. theses is covered as well.

3. Competencies Developed upon Completion of the Course

Upon successful completion of the course, the students will be able to write mathematical papers, reviews, dissertations etc. satisfying the standards of international mathematical community. They will know which grammatical structures are used in technical writing, the main tips on the style, reference books on mathematical English. Students will be familiar with major mathematical typesetting tools including the LaTeX system, the AMS-LaTeX and mathtools packages, the TikZ language of graphic description, the beamer document class, tools for preparing and maintaining large and complex documents, and the BibTeX bibliography meta-language.

Upon completion of the course, the student should have developed the following competencies:

Competence	Code	Descriptors	Activities
готовность использовать современные методы и технологии научной коммуникации на государственном и иностранном языках	УК-4	Students are able to write mathematical papers in English and use LaTeX-based typesetting tools.	Lectures, assignments, additional material/reading provided.
способность организовать работу исследовательского коллектива в области профессиональной деятельности	ОПК-3	Students are able to communicate their ideas in English; they have mastered the terminology of their research area and some related areas.	Lectures, assignments, additional material/reading provided.
способность представлять полученные результаты научно-исследовательской деятельности на высоком уровне и с учетом соблюдения авторских прав	ОПК-5	Students are able to clearly communicate their results and prepare computer presentations using LaTeX-based tools.	Lectures, assignments, additional material/reading provided.

4. Prerequisites

The study does not require specific mathematics or software engineering prerequisites, but depends on the students' maturity and research culture. Prior knowledge of one of the research fields developed at Faculties of Mathematics and Computer Science, as well as prior experience with some of the implementations of the TeX system, will be an advantage.

5. Schedule

№	Topic	Total hours	Contact hours			Self–study
			Lectures	Seminars	Practice	
1	Academic Writing	64	16			48
2	Academic Typesetting	88	12	10		66
	Total	152	28	10		114

6. Assessment

Home assignments	Eight biweekly assignments.
Exam	Written, 180 minutes.

7. Grading

The final mark is obtained by the following formula: Final = 0,5 * (exam) + 0,4 * (assignments) + 0,1 (work in class).

8. Course Description

Part 1: Academic Writing

1: Basic principles of scientific and technical writing. Understanding of the subject and the audience; i.e. having good ideas of “what to write about” and “for whom to write”. Planning: organization and arrangement of the material, choosing the notation. Avoiding notational dissonance and “freezed” letters. Making the logic clear. Beginning a new section with an outline of the setting. Making self-contained statements of results. The role of opening paragraphs.

2: Writing Mathematics in general. Avoiding slang, colloquialisms, abbreviations. Fighting excessive notation and “overloaded” punctuation signs. Possible sources of mathematical ambiguity (inexplicit use of quantifiers, suppressing simple arguments, assigning the same notation to different objects, etc.). “I” versus “we” versus “one” in mathematical writing. Examples of bad writing: starting a sentence with a notation, splitting infinitives, omitting “that”, “then” etc., using unnecessary special symbols, using ambiguous notation.

3: Specific types of mathematical communication. Books, theses, papers, lecture notes, reviews, references, presentation slides: similarities and differences. Curriculum vitae, job applications, grant proposals. Differences and similarities of various types of mathematical communication. The amount of background information that is reasonable to put.

4: Giving proper acknowledgements and avoiding plagiarism. Typical forms of acknowledgements. Citation principles and copyright issues (which citations are legal to

make without explicit permission of copyright holders). Using publicly available (e.g. online) resources. Most common types of copyright licences.

5: Advice of distinguished scholars. John Littlewood and his book “A mathematician’s miscellany”. Paul Halmos and his classic and very influential article “How to write mathematics”: writing in spirals, a continuous organization, rewrite vs. correct. Vladimir Arnold and his style of writing.

6: Principles of proof-reading. Waiting time before the proof-reading. What to check for. Using spell-checkers. Inviting test-readers.

Part 2: Academic Typesetting

7: The structure of LaTeX. Document classes and packages. Inline and display formulas. Common LaTeX commands in the mathematical modes. Some useful LaTeX commands in the text mode. Styles used in LaTeX documents.

8: Typesetting complex math in AMS-LaTeX and beyond. Subtle points of mathematical typesetting: TeX programming idioms, notation usage, “usual suspects” and common mistakes. The mathtools package.

9: Using PGF/Ti*k*Z to produce graphical illustrations in LaTeX. Why a TeX-specific tool is more appropriate than an external image editor. Basic structure of the Ti*k*Z graphics description language. Ti*k*Z libraries. Fundamentals of the visual display of quantitative information.

10: Preparing presentation slides in LaTeX. The beamer package. Best practices and common mistakes in preparing presentations.

11: Handling big documents: bibliographies and indices, tools, style files. Large document-specific technologies and procedures. Multifile projects in common TeX programming environments. Why there is no \chapter command in the article class? Indexing. A book as a typographic object.

12: The disser class and Russian official standards for dissertations. Specifics of the Russian dissertation procedures, standards, usage and best practices.

9. Educational Technologies

№ п/п	Вид занятия	Форма проведения занятий	Цель
1	Лекция	Изложение теоретического материала.	Получение теоретических знаний по дисциплине
2	Мультимедийная лекция	Изложение теоретического материала с показом слайдов, а также с демонстрацией работы ПО	Повышение степени понимания теоретического материала
3	Самостоятельная работа аспиранта	Самостоятельное составление научных текстов,	Отработка навыков использования обсуждаемых

		решение задач	методов и стратегий изложения и порождения научного текста
4	Самостоятельная работа аспиранта на ЭВМ	Реализация составленных текстов на ЭВМ в виде исходных файлов верстки, их компиляция	Закрепление навыков реализации методов на ЭВМ

10. Sample Exam Questions

1. Pretend that you are writing a textbook in Calculus. Give definitions of the following notions as they should appear in the book:

(1) a continuous function;
(2) a differential of a function;
(3) a uniformly continuous function;
(4) the Legesgue measure;
(5) the Riemann integral;
(6) the length of a curve.

2. Remove unnecessary notation from the statement of the following theorem: “Theorem. Every continuous function $f(x)$ on the interval [0, 1] attains its maximal value $\max_{x\in[0,1]} f(x)$ and its minimal value $\min_{x\in[0,1]} f(x)$.”

3. Remove unnecessary notation from the statement of the following theorem: “Theorem. Let $f(z)$ be a function analytic in the ring-shaped region between two concentric circles C and C', of radii R and R' ($R' < R$), and center a, and on the circles themselves. Then $f(z)$ can be expanded in a series of positive and negative powers of $z - a$, convergent at all points of the ring-shaped region.”

4. Type the character table for A_5 in LaTeX.

11. Reading

Mandatory

А.Б. Сосинский. Как написать математическую статью по-английски. – М.: Изд-во «Факториал-пресс», 2004. – 112 с.

С.М. Львовский. Набор и верстка в системе LaTeX. МЦНМО, 2006. - 448 с.

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[17] Wikipedia: BiBTeX (online http://ru.wikipedia.org/wiki/BibTeX)
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[20] M. Høgholm, L. Marsden. The mathtools package. (online http://www.ctan.org/macros/latex/contrib/mathtools/mathtools.pdf)
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[24] P. Wilson. A Few Notes on Book Design. (online http://mirror.macomnet.net/pub/CTAN/info/memdesign/memdesign.pdf)
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Software

TeX, BibTeX, compilers

12. Equipment

For lectures: multimedia equipment (a computer for presentations and a beamer), a blackboard.

Software: presentation software (Adobe Reader, etc.), TeX and TeX packages.