Course Syllabus

Skoltech

Идентификатор документа, задачи / ID: 406722 v.1, 339417
ДОКУМЕНТ ПОДПИСАН ПРОСТОЙ ЭЛЕКТРОННОЙ ПОДПИСЬЮ /
The document is signed with a simple electronic signature

Директор образовательной программы / The Director of the program
Грязина Елена Николаевна / Gryazina Elena Nikolaevna

Дата подписания / Date of signing 11.12.2025

Contact Person	Elena Gryazina
Contact Person's E-mail	e.gryazina@skoltech.ru
Course Title (in English)	Research Practice Seminar “Energy Systems and Technologies”
Course Title (in Russian)	Научно-практический семинар «Энергетические системы и технологии»
Lead Instructor	Gryazina, Elena

1. Annotation

Course Description

This seminar explores cutting-edge research trends in modern energy systems and technologies. Students work in teams to investigate specific research topics such as renewable generation, storage integration, smart grids, electrification of transport, hydrogen systems, and energy efficiency solutions. The seminar emphasizes independent research, teamwork, and academic presentation skills.

Guest lectures of scholars and industry representatives will also happen.

Аннотация

На этом семинаре рассматриваются передовые тенденции исследований в области современных энергетических систем и технологий. Студенты работают в командах над изучением конкретных тем, таких как возобновляемая генерация энергии, интеграция систем хранения энергии, интеллектуальные сети, электрификация транспорта, водородные системы и решения в области энергоэффективности. Семинар уделяет особое внимание развитию навыков самостоятельного исследования, командной работы и академических презентаций.

Также будут гостевые лекции профильных ученых и представителей индустрии.

2. Basic Information

Course Academic Level MSc PhD

Number of ECTS credits 3

Course Prerequisites / Recommendations

No

Type of Assessment Pass/Fail

Grading Scale

Pass: 70

Course Term (in context of Academic Year) Terms 2-3-4

Students of Which Programs do You Recommend to Consider this Course as an Elective?

BSc Programs	Masters Programs	PhD Programs
	Energy Systems	Engineering Systems

Maximum Number of Students

	Maximum Number of Students
Overall:	40
Per Group (for seminars and labs):	40

3. Course Content

ECTS Credit System – Reference Tool

Total Number of ast. Hours in Your Course 81

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Power and Energy Generation	This session will examine the evolving global energy mix, highlighting the balance between conventional sources and the rapid growth of renewables. Discussions will focus on technological advancements driving cleaner and more efficient generation, integration of distributed resources, and strategies for ensuring reliability and sustainability in a diversified energy landscape.	0	10	0	14
Energy Transmission and Distribution	This topic will address modern grid infrastructures, focusing on reliable power delivery, grid modernization, and the integration of digital technologies. Key discussions will include smart grids, resilience strategies, and optimization of transmission and distribution networks.	0	10	0	14

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Energy Consumption	The final session will examine end-use energy patterns, demand-side management, and energy efficiency measures. It will highlight strategies for sustainable consumption, smart metering, and the impact of electrification and digitalization on consumer behavior.	0	10	0	14
Guest lecture	The precise content depends on the invited speaker's background.	9	0	0	0

4. Learning Outcomes

Please specify course intended learning outcomes using
Skoltech Learning Outcomes Framework
.

1. FUNDAMENTAL KNOWLEDGE

1.2. KNOWLEDGE OF APPLIED SCIENCE AND ENGINEERING SCIENCE INCLUDING CONTEMPORARY METHODS AND TOOLS

2. PERSONAL AND GENERAL PROFESSIONAL SKILLS AND ATTRIBUTES:

2.1. COGNITION AND MODES OF REASONING

2.1.2. System thinking

2.1.5. Critical thinking and meta-cognition

2.2. ATTITUDES AND LEARNING PROCESS

2.2.5. Self-awareness and a commitment to self-improvement, lifelong learning and educating

2.3. ETHICS, EQUITY AND OTHER RESPONSIBILITIES

2.3.1. Ethical action, integrity and courage

3. INTERPERSONAL SKILLS

3.1. COMMUNICATIONS IN INTERNATIONAL ENVIRONMENTS

3.1.3. Oral presentation and discussion

3.2. TEAMWORK AND LEADERSHIP

3.2.1. Forming effective teams

3.3. COLLABORATION AND CHANGE

3.3.5. Bringing about intentional change

4. LEADING THE INNOVATION PROCESS

4.1. MAKING SENSE OF GLOBAL SOCIETAL ENVIRONMENTAL AND BUSINESS CONTEXT

4.1.1. Appreciating the potential and limitations of science and technology, their role in society and society's role in their evolution

4.1.3. Understanding the technical products, systems and infrastructure of the sector

4.1.4. Understanding the enterprise — culture, stakeholders, strategy and goals

4.3. VISIONING — CONCEIVING AND DESIGNING SUSTAINABLE SYSTEMS

4.3.1. Identifying stakeholders need and wants

4.3.2. Identifying and formulating objectives and goals

5. Assignments and Grading

In-person Attendance Requirement 80

In-person Attendance Requirement Comment

The attendance is critically important since we polish the art of academic discussion.

Assignment Type	Assignment Summary	% of Final Course Grade
Class participation	Students should be active during each class .	40
Presentation	Presentation in Term 2. Development of selected topic. Team presentation at the end of the Term.	20
Presentation	Presentation in Term 3. Development of selected topic. Team presentation at the end of the Term.	20
Presentation	Presentation in Term 4. Development of selected topic. Team presentation at the end of the Term.	20

6. Assessment Criteria

Select Assignment 1 Type Presentation

Input Sample of Assignment 1 or Share a Link to Assignment 1

Hydro Power and Nuclear Energy

Assessment Criteria for Assignment 1

Student presentations will be assessed based on several clear criteria: the content and critical analysis of the chosen topic, including depth of understanding and ability to synthesize ideas; the logical structure and organization of the presentation, ensuring a clear flow from introduction to conclusion; the clarity and delivery of speech, with appropriate pacing, tone, and minimal reliance on notes; and the use of visual aids, which should effectively support the spoken content. Additional emphasis will be placed on engagement and interaction, including the ability to respond thoughtfully to questions and manage time effectively. Class participation will be evaluated through active involvement in discussions, quality of questions and comments, responsiveness and interaction with peers, and professional conduct that contributes to a respectful and collaborative seminar environment.

Select Assignment 2 Type Class participation

Assessment Criteria for Assignment 2

Students are active during each class. Students asking and answering questions .

7. Textbooks and Internet Resources

You can request at most two required textbooks. Additionaly, you can suggest up to nine recommended textbooks.

Required Textbooks	ISBN-13 (or ISBN-10)
-	

8. Facilities

9. Additional Notes

Is this syllabus complete?

Yes, the syllabus is a final draft waiting for approval by Education Department

The proposed course 1) has explicit academic content and requirements for receiving credits, 2) is in alignment with the program's learning outcomes, 3) adheres to policies and Skoltech regulations.

Lead Instructor confirms

Syllabus status

Approved by the Education Department

Course Syllabus

Skoltech

Идентификатор документа, задачи / ID: 475877 v.1, 444701

ДОКУМЕНТ ПОДПИСАН ПРОСТОЙ ЭЛЕКТРОННОЙ ПОДПИСЬЮ /
The document is signed with a simple electronic signature

Проректор по учебной работе / Dean of Education Столяров Денис Валерьевич / Stolyarov Denis Valerevich

Дата подписания / Date of signing 09.09.2026

Contact Person	Zhanna Turubarova
Contact Person's E-mail	z.turubarova@skoltech.ru
Course Title (in English)	Industrial Immersion
Course Title (in Russian)	Производственная практика
Lead Instructor	-

1. Annotation

Course Description

The goal of Industrial Immersion program is to provide for Skoltech students real hands-on work experience in an industrial sector and develop the knowledge and skills for making an impact through engineering and innovation. The Industrial immersion is performed in a sector company and it implies that internships at academic institutions (like universities etc.) are excluded. Duration of program is 8 weeks. Project focuses on short-term development, manufacturing or operations challenges rather than long-term research problems and is co-supervised by company and Skoltech. The internship is cooperatively planned: project assignment is provided by a company and subject for approval of Industrial Immersion Program Coordinator (I.I.P.C.).

Аннотация

Цель программы "Индустриальное погружения" — предоставить студентам Сколтеха опыт практический работы в промышленном секторе, развить навыки и знания для их будущего применения в областях инженерии и инноваций. Индустриальное погружение осуществляется в отраслевой компании и исключает практику в академических учреждениях (например, университетах и т. д.). Продолжительность программы 8 недель. В отличие от долгосрочных исследовательских задач проект практики представляет собой выполнение краткосрочной технологической задачи в сфере разработки, производства или эксплуатации под руководством кураторов от компании и Сколтеха. Подготовка проекта практики планируется Институтом и компанией совместно: задание на проект предоставляется компанией и подлежит утверждению координатором программы индустриального погружения

2. Basic Information

Course Academic Level	MSc
Number of ECTS credits	12

Course Prerequisites / Recommendations

To participate in Industrial Immersion a student should successfully complete the compulsory courses of the 1st year of study.

Type of Assessment Pass/Fail

Grading Scale

Pass: 90

Course Term (in context of Academic Year) Summer Term

Students of Which Programs do You Recommend to Consider this Course as an Elective?

BSc Programs	Masters Programs	PhD Programs
	AI in Robotics Advanced Computational Science Advanced Manufacturing Technologies Applied Computational Mechanics Applied Photonics and Optical Information Systems Data Science Digital Electrical Energy Energy Systems Engineering Systems Internet of Things and Wireless Technologies Life Sciences Materials Science Next Generation Communication Technologies Petroleum Engineering Photonics and Quantum Materials	

Maximum Number of Students

	Maximum Number of Students
Overall:	300
Per Group (for seminars and labs):	300

3. Course Content

ECTS Credit System – Reference Tool

Total Number of ast. Hours in Your Course 324

Maximum Contact Hours in Your Course 162

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Self-marketing on Paper.Resume.	Students prepare and submit resumes via Canvas due to the date specified by Education Office. Strong and competitive profile increases student's chances to be selected into a high-quality project with a prestigious company.	1			
Project work in a company. Final report.	Students work in a company on project assignment. The results are to be provided in a written form: - individual report is submitted via Canvas and approved both by company project supervisor and Skoltech project supervisor.	320			
Presentation	Students are required to make written and oral presentation of their project: - project team poster is submitted via Canvas and approved both by the company project supervisor and Skoltech project supervisor; - students should exhibit their posters at the Skoltech Industry Day and be prepared to answer questions about the project implementation and results.	3			

4. Learning Outcomes

Please specify course intended learning outcomes using
Skoltech Learning Outcomes Framework
.

1. FUNDAMENTAL KNOWLEDGE

1.1. KNOWLEDGE OF MATHEMATICS AND NATURAL SCIENCES

1.2. KNOWLEDGE OF APPLIED SCIENCE AND ENGINEERING SCIENCE INCLUDING CONTEMPORARY METHODS AND TOOLS

1.3. KNOWLEDGE OF INNOVATION AND ENTREPRENEURSHIP

2. PERSONAL AND GENERAL PROFESSIONAL SKILLS AND ATTRIBUTES:

2.1. COGNITION AND MODES OF REASONING	2.1.1. Analytical reasoning and problem solving 2.1.2. System thinking 2.1.3. Creative thinking 2.1.5. Critical thinking and meta-cognition
2.3. ETHICS, EQUITY AND OTHER RESPONSIBILITIES	2.3.5. Proactive vision and intention in life 2.3.6. Commitment to social and professional behavior
3. INTERPERSONAL SKILLS	
3.1. COMMUNICATIONS IN INTERNATIONAL ENVIRONMENTS	3.1.3. Oral presentation and discussion 3.1.6. Effective interaction in different cultural and international settings
3.2. TEAMWORK AND LEADERSHIP	3.2.1. Forming effective teams 3.2.2. Team operations and project management 3.2.5. Technical and multidisciplinary teaming
3.3. COLLABORATION AND CHANGE	3.3.1. Establishing diverse connections and networking
4. LEADING THE INNOVATION PROCESS	
4.2. VISIONING — INVENTING NEW TECHNOLOGIES THROUGH RESEARCH	4.2.3. Research aimed at developing new technologies
4.3. VISIONING — CONCEIVING AND DESIGNING SUSTAINABLE SYSTEMS	4.3.2. Identifying and formulating objectives and goals 4.3.5. Understanding the technical context and ecosystem of the product or service
4.4. DELIVERING ON THE VISION — IMPLEMENTING AND OPERATING	4.4.2. Manufacturing and supply chain operations 4.4.4. Implementation and operations management
4.5. DELIVERING ON THE VISION — ENTREPRENEURSHIP AND ENTERPRISE	4.5.4. Initiating engineering and development processes

5. Assignments and Grading

In-person Attendance Requirement	320

Assignment Type	Assignment Summary	% of Final Course Grade
Project	Students work in companies over a period of eight weeks during summer term. The project work is performed under close guidance of a company project supervisor and Skoltech project supervisor. Following the end of the industrial immersion students should fill in the on-line report form and submit it via Canvas on the final day of the immersion. The report is approved by company project supervisor and Skoltech project supervisor.	70
Poster	Together with individual report students should also submit individual/team project posters via Canvas. A poster comprises the following sections: 1)Project title; 2)Background of the Project Task; 3)Objectives; 4)Process; 5)Results; 6)Conclusions. Poster template is provided and should be used as mandatory to ensure a better visibility of all posters exhibited at the Industry Day.	20
Other	All students should attend Skoltech Industry Day, exhibit their posters at a poster session and answer questions. The poster should be provisionally approved by company project supervisor and Skoltech project supervisor.	10

6. Assessment Criteria

Select Assignment 1 Type Project

Input Sample of Assignment 1 or Share a Link to Assignment 1

More details are provided in LMS - Canvas.

Or Upload Sample of Assignment 1

Assessment Criteria for Assignment 1

The project is fully completed as per the task set by the company, the expected results are achieved. The report is submitted by a student in Canvas on time. The report is approved by company project leader and Skoltech Supervisor as Pass/Fail.
The report consists of three sections:
1. Describe what you have accomplished (be specific) and the progress made toward the objective/goal
2. Describe any significant problems you faced and solutions found. If a project took a different course and your tasks/goals changed (from initially planned), describe why
3. Summarize the outcomes of the project for the company (how the results can be used/implemented).
Criteria for the PASS assessment:
1. realization of project diligently and in accordance with company's requirements;
2. results meet the planned objective considering the industrial environment and constraints.

Select Assignment 2 Type

Other

Input Sample of Assignment 2 or Share a Link to Assignment 2

Poster. More details are provided in LMS - Canvas.

Or Upload Sample of Assignment 2

Assessment Criteria for Assignment 2

Poster is created against the template and submitted via Canvas. The poster is approved by Company project leader and Skoltech Supervisor. Quality check includes 1.complience of the presented information with the actual work peformed; 2. Structuring of information and formatting of text as per the template - text is clear and to the point; 3. Effective use of graphics, color and fonts; 4.Content is in accordance with the structure of the poster template.

Select Assignment 3 Type

Other

Input Sample of Assignment 3 or Share a Link to Assignment 3

Participation in Industry Day

Assessment Criteria for Assignment 3

Students attend Skoltech Industry Day, exhibit posters at a poster session and answer questions about the project implementation and results.

7. Textbooks and Internet Resources

You can request at most two required textbooks. Additionaly, you can suggest up to nine recommended textbooks.

Required Textbooks	ISBN-13 (or ISBN-10)
Product design and Development, Karl T. Ulrich, Eppinger, fifth edition.	9780073404776

Recommended Textbooks	ISBN-13 (or ISBN-10)
Technology Entrepreneurship: Taking Innovation to the Marketplace Thomas N. Duening, Robert A. Hisrich and Michael A. Lechter.	9780124201750

Recommended Textbooks	ISBN-13 (or ISBN-10)
Lean Customer Development: Building Products Your Customers Will Buy, Cindy Alvarez.	9781492023746

Web-resources (links)	Description
https://disk.360.yandex.ru/i/84o8fKw5j0zT_w	PPT

8. Facilities

Software
Provided by a host company if necessary

Equipment
Provided by a host company

9. Additional Notes

Free Style Comments (if any)

- Short list of companies and projects is prepared by Skoltech and offered to students;
- Proposal for internship project with a curtain company can arrive directly from a student but the project needs to be approved by Skoltech;
- Best industrial immersion project is selected by each Program and awarded at the Conference Skoltech Industry Day:

Overall criteria:

- Industrial component is clearly presented
- Industrial application of the project findings is apparent
- Positive/exceptional feedback of the host company
- Results clearly met or exceeded the planned objectives

Poster:

- Context section provides appropriate perspective/background for the subject
- Objectives are clearly stated
- Process described is accurate and transparent.
- Objectives are met/addressed
- Clarity of presentation. Referencing tables, graphs etc. are well arranged

https://summer-internship.skoltech.ru/

Is this syllabus complete?

Yes, the syllabus is a final draft waiting for approval by Education Department

The proposed course 1) has explicit academic content and requirements for receiving credits, 2) is in alignment with the program's learning outcomes, 3) adheres to policies and Skoltech regulations.

Lead Instructor confirms

Syllabus status	Approved by the Education Department

Skoltech

Идентификатор документа, задачи / ID: 490688 v.1, 467650

ДОКУМЕНТ ПОДПИСАН ПРОСТОЙ ЭЛЕКТРОННОЙ ПОДПИСЬЮ /
The document is signed with a simple electronic signature

Проректор по учебной работе / Dean of Education Столяров Денис Валерьевич / Stolyarov Denis Valerevich

Дата подписания / Date of signing 31.10.2026

Course Syllabus

Course Title	Early Research Project
Course Title (in Russian)	Научно-исследовательская работа. Учебная практика
Lead Instructor	-

1. Annotation

Course Description

"Early Research Project" is one of the mandatory educational elements during the preparation of the Thesis by MSc students.
"Early Research Project" is one or several scientific projects carried out by an MSc student under the guidance of academic stuff during Term 3 and 4 of the first academic year. It's a preparatory stage in the process of writing a Thesis.
This element is preceded by the preliminary assignment of a supervisor and the selection of a preliminary research topic in the field of the student's professional activity.
The purpose of "Early Research Project" is:

- to define the topic of the Thesis;
- to set the problems of the proposed research;
- to familiarize yourself with the requirements of the supervisor;
- to determine the student's role in the proposed research.

Course Description (in Russian)

"Научно-исследовательская работа. Учебная практика" - один из обязательных учебных элементов в процессе подготовки выпускной квалификационной работы (ВКР) студентами магистратуры.
Это один или несколько научных проектов, выполняемых студентом под руководством научно-педагогического работника (НПР), в течение 3 и 4 учебных модулей первого учебного года, которые являются подготовительным этапом к написанию выпускной квалификационной работы (ВКР).
Этому элементу предшествует предварительное закрепление научного руководителя и выбор предварительной темы исследования в области профессиональной деятельности студента.
Целью элемента "Научно-исследовательская работа. Учебная практика" является:

- определение темы будущего проекта магистерской диссертации;
- определение проблематики предполагаемого исследования;
- знакомство с требованиями научного руководителя;
- определение роли студента в предполагаемом исследовании.

2. Basic Information

Course Academic Level

MSc

Number of ECTS credits

6

Course Prerequisites / Recommendations

1) preliminary assignment of a supervisor;
2) the selection of a preliminary research topic in the field of the student's professional activity.

Type of Assessment

Graded

Mapping from grades to percentage:

A: 86

B: 76

C: 66

D: 56

E: 46

Term

Term 3 Term 4

Students of Which Programs do You Recommend to Consider this Course as an Elective?

BSc Programs	Masters Programs	PhD Programs
	AI in Robotics Advanced Computational Science Advanced Manufacturing Technologies Applied Computational Mechanics Applied Photonics and Optical Information Systems Data Science Energy Systems Engineering Systems Internet of Things and Wireless Technologies Life Sciences Materials Science Mathematical and Theoretical Physics Next Generation Communication Technologies Petroleum Engineering Photonics and Quantum Materials Technological Entrepreneurship and Innovative Business Development	

Maximum Number of Students

	Maximum Number of Students
Overall:	300
Per Group (for seminars and labs):	300

Course Stream

Research & MSc Thesis Project

3. Course Content

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Planning of the project	1) To find a research advisor 2) Confirm the project plan with research advisor		15		4
Project executions	Carrying out the project in accordance with the project plan		15	15	80
Reporting	1) Written report submitted in LMS (Canvas)		15		18

4. Learning Outcomes

Skoltech Learning Outcomes are indicated as per Skoltech Learning Outcomes Framework.

1. FUNDAMENTAL KNOWLEDGE

1.1. KNOWLEDGE OF MATHEMATICS AND NATURAL SCIENCES

1.2. KNOWLEDGE OF APPLIED SCIENCE AND ENGINEERING SCIENCE INCLUDING CONTEMPORARY METHODS AND TOOLS

2.1. COGNITION AND MODES OF REASONING

2.1.1. Analytical reasoning and problem solving

2.1.2. System thinking

2.2. ATTITUDES AND LEARNING PROCESS

2.2.3. Responsibility, intensity, perseverance, urgency and will to deliver

2.2.5. Self-awareness and a commitment to self-improvement, lifelong learning and educating

2.3. ETHICS, EQUITY AND OTHER RESPONSIBILITIES

2.3.1. Ethical action, integrity and courage

2.3.5. Proactive vision and intention in life

2.3.6. Commitment to social and professional behavior

3.1. COMMUNICATIONS IN INTERNATIONAL ENVIRONMENTS

3.1.4. Inquiry, listening and dialogue

3.1.5. Communications in English in scientific, business and social settings

4.1. MAKING SENSE OF GLOBAL SOCIETAL ENVIRONMENTAL AND BUSINESS CONTEXT

4.1.3. Understanding the technical products, systems and infrastructure of the sector

4.2. VISIONING — INVENTING NEW TECHNOLOGIES THROUGH RESEARCH

4.2.1. The research process — hypothesis, evidence and defense

4.3. VISIONING — CONCEIVING AND DESIGNING SUSTAINABLE SYSTEMS

4.3.2. Identifying and formulating objectives and goals

4.3.5. Understanding the technical context and ecosystem of the product or service

5. Assignments and Grading

Physical Attendance Requirement (% of classes)	100

Assignment Type	Assignment Summary	% of Final Course Grade
Report	"Early Research Project" is resulted in a report on the completed work, which includes a description of: • project; • project goals; • alignment of the student's personal professional goals with the project content; • student's role; • achieved results; • problems encountered during the work on the project and ways of their overcoming; • general conclusions; • description of the reporting format which is provided by the student to the supervisor.	100

6. Assessment Criteria

Assignment 1 Type

Report

Sample of Assignment 1

Report is completed and submitted.

Report includes:
1) Student's name
2) Supervisor's name and his/her affiliation
3) Project title in Russian and in English
4) Description of the project
5) Alignment of the student's personal professional goals with the project content
6) Results achieved
7) Problems encountered during the work on the project and ways of their overcoming;
8) General conclusions;
9) Description of the reporting format which is provided by the student to the supervisor.

Assessment Criteria for Assignment 1

1. The general project goal and aims are clear and well defined.
2. The problems encountered during the work (organizational, research-related, etc.) are identified, and appropriate solutions are proposed.
3. All results are described and discussed correctly.
4. Conclusions reflect the goal and aims of the project.
5. The scientific report materials provided to the supervisor are submitted in LMS (Canvas) full and complete.

7. Textbooks and Internet Resources

You can request at most two required textbooks. Additionaly, you can suggest up to nine recommended textbooks.

Required Textbooks	ISBN-13 (or ISBN-10)
-	

8. Facilities

9. Additional Notes

Comments

The workload distributed between contact hours and student's independent study (non-contact hours) is advisory.

The proposed course 1) has explicit academic content and requirements for receiving credits, 2) is in alignment with the program's learning outcomes, 3) adheres to policies and Skoltech regulations.

Lead Instructor confirms

Course Syllabus

Skoltech

Идентификатор документа, задачи / ID: 481661 v.1, 453706

ДОКУМЕНТ ПОДПИСАН ПРОСТОЙ ЭЛЕКТРОННОЙ ПОДПИСЬЮ /
The document is signed with a simple electronic signature

Проректор по учебной работе / Dean of Education Столяров Денис Валерьевич / Stolyarov Denis Valerevich

Дата подписания / Date of signing 30.09.2026

Contact Person	Anastasia Tyagusova
Contact Person's E-mail	a.tyagusova@skoltech.ru
Course Title (in English)	Thesis Research Project
Course Title (in Russian)	Научно-исследовательская работа. Преддипломная практика
Lead Instructor	-

1. Annotation

Course Description

Thesis Research Project - is one of the compulsory educational elements for second-year MSc students while preparing their Thesis. As per curriculum plan Thesis Research Project is completed by the students during the second year of studies.
The aim of this educational element is to prepare a scientific project (Thesis), which is a program requirement.
The results of Thesis Research Project are demonstrated by the students on a consistent and regular basis when some parts of work are ready.
Apart from the regular reports sent by the students to their supervisors, the results of this educational element are: Thesis Title (in Russian and English), Status Report, MSc Thesis Draft, MSc Thesis Manuscript.

Аннотация

«Научно-исследовательская работа. Преддипломная практика» – один из обязательных учебных элементов в процессе подготовки выпускной квалификационной работы (ВКР) студентами второго года магистратуры. «Научно-исследовательская работа. Преддипломная практика.» выполняется студентами в течение второго года обучения.
Целью элемента «Научно-исследовательская работа. Преддипломная практика.» является подготовка научного проекта студента, необходимого для выполнения требований образовательной программы и написания магистерской диссертации. Результаты освоения преддипломной практики демонстрируются студентом последовательно на регулярной основе по мере выполнения отдельных частей исследовательской работы. Результатами помимо регулярных отчетов, предоставляемых студентом научному руководителю, являются: утверждение темы диссертации на русском и английском языках, первый проект текста ВКР (Status Report), проект текста ВКР (MSc Thesis Draft) и финальный текст ВКР (MSc Thesis Manuscript).

2. Basic Information

Course Academic Level	MSc

Number of ECTS credits 12

Course Prerequisites / Recommendations

Student should successfully pass IW, Early Research Project, Industrial Immersion

Type of Assessment Pass/Fail

Grading Scale

Pass: 60

Students of Which Programs do You Recommend to Consider this Course as an Elective?

BSc Programs	Masters Programs	PhD Programs
	AI and Financial Technologies AI Robotics Advanced Computational Science Advanced Manufacturing Technologies Applied Computational Mechanics Applied Photonics and Optical Information Systems Data Science Digital Electrical Energy Energy Systems Engineering Systems Internet of Things and Wireless Technologies Life Sciences Materials Science Mathematical and Theoretical Physics Next Generation Communication Technologies Petroleum Engineering Photonics and Quantum Materials Technological Entrepreneurship and Innovative Business Development	

Maximum Number of Students

	Maximum Number of Students
Overall:	400
Per Group (for seminars and labs):	400

3. Course Content

Course contains Industry-oriented elements?

No

ECTS Credit System – Reference Tool

Total Number of ast. Hours in Your Course	324
Maximum Contact Hours in Your Course	162

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Thesis Project	to prepare a scientific project (Thesis), which is a program requirement		40		41

4. Learning Outcomes

Please specify course intended learning outcomes using Skoltech Learning Outcomes Framework.

1. FUNDAMENTAL KNOWLEDGE

- 1.1. KNOWLEDGE OF MATHEMATICS AND NATURAL SCIENCES
- 1.2. KNOWLEDGE OF APPLIED SCIENCE AND ENGINEERING SCIENCE INCLUDING CONTEMPORARY METHODS AND TOOLS
- 1.3. KNOWLEDGE OF INNOVATION AND ENTREPRENEURSHIP

2. PERSONAL AND GENERAL PROFESSIONAL SKILLS AND ATTRIBUTES:

2.1. COGNITION AND MODES OF REASONING

- 2.1.1. Analytical reasoning and problem solving
- 2.1.2. System thinking
- 2.1.3. Creative thinking
- 2.1.5. Critical thinking and meta-cognition

2.2. ATTITUDES AND LEARNING PROCESS

- 2.2.1. Initiative and the willingness to take appropriate risks
- 2.2.2. Willingness to make decisions in the face of uncertainty

2.3. ETHICS, EQUITY AND OTHER RESPONSIBILITIES

- 2.3.5. Proactive vision and intention in life

	2.3.6. Commitment to social and professional behavior
3. INTERPERSONAL SKILLS	
3.1. COMMUNICATIONS IN INTERNATIONAL ENVIRONMENTS	3.1.3. Oral presentation and discussion
	3.1.6. Effective interaction in different cultural and international settings
3.2. TEAMWORK AND LEADERSHIP	3.2.2. Team operations and project management
4. LEADING THE INNOVATION PROCESS	
4.2. VISIONING — INVENTING NEW TECHNOLOGIES THROUGH RESEARCH	4.2.2. Basic research leading to new scientific discovery
	4.2.3. Research aimed at developing new technologies
	4.2.4. Imagining utility of new science and technology
4.3. VISIONING — CONCEIVING AND DESIGNING SUSTAINABLE SYSTEMS	4.3.1. Identifying stakeholders need and wants
	4.3.2. Identifying and formulating objectives and goals
	4.3.3. Conceiving and architecting products and services around new technologies and identifying their impact
	4.3.5. Understanding the technical context and ecosystem of the product or service
4.4. DELIVERING ON THE VISION — IMPLEMENTING AND OPERATING	4.4.1. Designing and optimizing sustainable and safe implementation and operations
	4.4.4. Implementation and operations management
4.5. DELIVERING ON THE VISION — ENTREPRENEURSHIP AND ENTERPRISE	4.5.7. Managing intellectual property and respecting the legal process

5. Assignments and Grading

In-person Attendance Requirement 100

Assignment Type	Assignment Summary	% of Final Course Grade
Report	Students report directly to their research advisors and submit related assignments: Thesis Proposal, Status Report, Thesis Draft, Final Manuscript	100

6. Assessment Criteria

Select Assignment 1 Type

Report

Input Sample of Assignment 1 or Share a Link to Assignment 1

for more information check Canvas page of the course.

Assessment Criteria for Assignment 1

for assessment criteria check Canvas page of the course.

Select Assignment 2 Type

Other

Input Sample of Assignment 2 or Share a Link to Assignment 2

for more information related to Thesis Proposal, Status Report, MSc Thesis Draft, MSc Thesis Manuscript check Canvas page of the course.

Assessment Criteria for Assignment 2

for assessment criteria related to Thesis Proposal, Status Report, MSc Thesis Draft, MSc Thesis Manuscript check Canvas page of the course.

7. Textbooks and Internet Resources

You can request at most two required textbooks. Additionaly, you can suggest up to nine recommended textbooks.

Required Textbooks	ISBN-13 (or ISBN-10)
State Final Attestation Policy: https://lms.skoltech.ru/courses/2072/files/folder/2.%20MSc/Research/MSc%20Thesis%20Project?preview=28878	
anything recommended by the supervisor	

8. Facilities

9. Additional Notes

Is this syllabus complete?

Yes, the syllabus is a final draft waiting for approval by Education Department

The proposed course 1) has explicit academic content and requirements for receiving credits, 2) is in alignment with the program's learning outcomes, 3) adheres to policies and Skoltech regulations.

Lead Instructor confirms

Syllabus status

Approved by the Education Department

Course Syllabus

Skoltech

Идентификатор документа, задачи / ID: 481661 v.1, 453706

ДОКУМЕНТ ПОДПИСАН ПРОСТОЙ ЭЛЕКТРОННОЙ ПОДПИСЬЮ /
The document is signed with a simple electronic signature

Проректор по учебной работе / Dean of Education Столяров Денис Валерьевич / Stolyarov Denis Valerevich

Дата подписания / Date of signing 30.09.2026

Contact Person	Anastasia Tyagusova
Contact Person's E-mail	a.tyagusova@skoltech.ru
Course Title (in English)	Status Review
Course Title (in Russian)	Предварительная предзащита
Lead Instructor	-

1. Annotation

Course Description

Status Review is a thesis-related element that each second-year MSc student should pass during Term 6. The aim of Status Review is to present intermediate results of research project (research plan, report on results). It is required that students cunduct their thesis research in term 6 according to the Thesis Proposal plan. The report provided in the end of term 6 is a pre-requisite for students to be able to present the interim results of their MSc thesis research at a Status Review. For students of the Startup-as-Thesis track, the Status Review is covered as part of the Expert Panel Meeting presentation in January of the second year of study

Аннотация

Предварительная предзащита - это элемент, непосредственно связанный с магистерской диссертацией, который должен пройти каждый магистр второго года обучения в 6 учебной четверти. Целью “Предварительной предзащиты" является представление студентами промежуточных результатов реализации плана научного исследования и доклад о полученных результатах исследования. Студенты проводят исследование по теме диссертации в 6 четверти в соответствии с Планом научно-исследовательской работы. Отчёт, предоставляемый в конце 6 четверти, является обязательным условием для того, чтобы студенты могли представить промежуточные результаты своего исследования по магистерской диссертации на Предварительной предзащите. Для студентов трека «Startup-as-Thesis» Предварительная предзащита проводится в формате презентации на заседании экспертной панели в январе второго года обучения.

2. Basic Information

Course Academic Level	MSc
Number of ECTS credits	3

Course Prerequisites / Recommendations

Early Research Project, Industrial Immersion, Innovation Workshop, Thesis Proposal, Thesis Status Report

Type of Assessment Graded

Grading Scale

A: 86

B: 76

C: 66

D: 56

E: 46

F: 0

Course Term (in context of Academic Year) Term 2 Winter Term

Students of Which Programs do You Recommend to Consider this Course as an Elective?

BSc Programs	Masters Programs	PhD Programs
	All Master Programs	

Maximum Number of Students

	Maximum Number of Students
Overall:	400
Per Group (for seminars and labs):	400

3. Course Content

Course contains Industry-oriented elements?

No

ECTS Credit System – Reference Tool

Total Number of ast. Hours in Your Course 81

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Status Review	present intermediate results of research project (research plan, report on results)		10		71

4. Learning Outcomes

Please specify course intended learning outcomes using Skoltech Learning Outcomes Framework.

1. FUNDAMENTAL KNOWLEDGE

- 1.1. KNOWLEDGE OF MATHEMATICS AND NATURAL SCIENCES
- 1.2. KNOWLEDGE OF APPLIED SCIENCE AND ENGINEERING SCIENCE INCLUDING CONTEMPORARY METHODS AND TOOLS
- 1.3. KNOWLEDGE OF INNOVATION AND ENTREPRENEURSHIP

2. PERSONAL AND GENERAL PROFESSIONAL SKILLS AND ATTRIBUTES:

2.1. COGNITION AND MODES OF REASONING

- 2.1.1. Analytical reasoning and problem solving
- 2.1.2. System thinking
- 2.1.3. Creative thinking

2.2. ATTITUDES AND LEARNING PROCESS

- 2.2.1. Initiative and the willingness to take appropriate risks
- 2.2.2. Willingness to make decisions in the face of uncertainty

2.3. ETHICS, EQUITY AND OTHER RESPONSIBILITIES

- 2.3.5. Proactive vision and intention in life
- 2.3.6. Commitment to social and professional behavior

3. INTERPERSONAL SKILLS

3.1. COMMUNICATIONS IN INTERNATIONAL ENVIRONMENTS

- 3.1.3. Oral presentation and discussion
- 3.1.6. Effective interaction in different cultural and international settings

3.2. TEAMWORK AND LEADERSHIP

- 3.2.2. Team operations and project management

4. LEADING THE INNOVATION PROCESS

4.2. VISIONING — INVENTING NEW TECHNOLOGIES THROUGH RESEARCH

- 4.2.2. Basic research leading to new scientific discovery
- 4.2.3. Research aimed at developing new technologies
- 4.2.4. Imagining utility of new science and technology

4.3. VISIONING — CONCEIVING AND DESIGNING SUSTAINABLE SYSTEMS

- 4.3.1. Identifying stakeholders need and wants

	4.3.2. Identifying and formulating objectives and goals
	4.3.3. Conceiving and architecting products and services around new technologies and identifying their impact
	4.3.5. Understanding the technical context and ecosystem of the product or service
4.4. DELIVERING ON THE VISION — IMPLEMENTING AND OPERATING	4.4.1. Designing and optimizing sustainable and safe implementation and operations
	4.4.4. Implementation and operations management
4.5. DELIVERING ON THE VISION — ENTREPRENEURSHIP AND ENTERPRISE	4.5.7. Managing intellectual property and respecting the legal process

5. Assignments and Grading

In-person Attendance Requirement 100

Assignment Type	Assignment Summary	% of Final Course Grade
Presentation	Presentation is to be submitted in Canvas. The format is different for regular- and Startup-as-thesis-track students	100

6. Assessment Criteria

Select Assignment 1 Type Presentation

Input Sample of Assignment 1 or Share a Link to Assignment 1

Status Review Presentation (regular):
1) Student's Full name and Educational Program;
2) Title
3) Description of the General problem / Introduction / Background
3) Aim and objectives set
4) Methods
5) Plan of the following steps
8) Conclusions

Assessment Criteria for Assignment 1

Status Review Presentation:

1. Literature review critically evaluates existing views and opinions in the area of research and concludes with research problem statement.
2. Research problem is clearly stated and relevant to contemporary science demands
3. The goal and objectives are clear and well defined. Project plan is consistent and meets the goal.
4. Techniques and methods are selected and applied correctly. Limitations and accuracy of methods applied are considered and described.
5. The student demonstrates proficiency in the English language sufficient for professional communication.

A – Excellent

B – Good, but can be improved
C – Satisfactory, marginally acceptable performance to get Skoltech MSc degree, significant improvement recommended
D – Insufficient, significant improvements are required to get Skoltech MSc degree
E – Poor, drastic improvements are required to get Skoltech MSc degree
F – Fail, there is insufficient evidence of any research performed by the student

Select Assignment 2 Type Presentation

Input Sample of Assignment 2 or Share a Link to Assignment 2

Status Review Presentation (Startup as Thesis):
1. Problem Statement: Usage case
2. Problem Statement: Current alternatives
3. Problem Statement: Your Solution
4. Business opportunity
5. Individual Contribution
6. Individual Aim and Objectives
7. Methods
8. Current Progress / Results achieved (if any)
9. Plans
10. Conclusions (obtained, desired)

Assessment Criteria for Assignment 2

1. The Science-Technology-Engineering Part (5 – 4 – 3 – 2 – 1):
- Proposed technology / product description
- The individual scientific aim and objectives as part of the SAT project
- Methods used to achieve the individual research task
- Current progress and results of the individual research

2. Individual Work Plan (5 – 4 – 3 – 2 – 1)
3. Individual student's scientific contribution to Startup Project (5 – 4 – 3 – 2 – 1)
4. Established Startup Project team: expertise, roles and responsibilities (5 – 4 – 3 – 2 – 1)
5. The Entrepreneurial Part (5 – 4 – 3 – 2 – 1):
- Problem Statement: Usage case
- Current alternatives
- Expected impact of the proposed technology / product
- Business Model – Competitive Advantages, Commercialization directions, Revenue Streams, Competitive Landscape

6. Application for financial support submitted: yes / no
7 * Developed MVP or Prototype (5 – 4 – 3 – 2 – 1)
8. * Positive decision on the application obtained • yes
- no

9. * Legal entity implementing a Startup Project registered: yes
- no

10. * Patent application prepared and submitted in due order: yes / no
11. * Financial support demonstrated: yes / no
12. Final Resolution:
Recommend a Startup Project as Thesis for defense at the SFA: yes / no
13. Status Review Grade: A – B – C – D – E – F
A – Excellent
B – Good, but can be improved
C – Satisfactory, marginally acceptable performance to get Skoltech MSc degree, significant improvement recommended
D – Insufficient, significant improvements are required to get Skoltech MSc degree
E – Poor, drastic improvements are required to get Skoltech MSc degree
F – Fail, there is insufficient evidence of any research performed by the student

* - not mandatory

7. Textbooks and Internet Resources

You can request at most two required textbooks. Additionaly, you can suggest up to nine recommended textbooks.

Required Textbooks	ISBN-13 (or ISBN-10)
anything required by the supervisor	

8. Facilities

9. Additional Notes

Free Style Comments (if any)

Status Review - grade

Is this syllabus complete?

Yes, the syllabus is a final draft waiting for approval by Education Department

The proposed course 1) has explicit academic content and requirements for receiving credits, 2) is in alignment with the program's learning outcomes, 3) adheres to policies and Skoltech regulations.

Lead Instructor confirms

Syllabus status

Approved by the Education Department

Course Syllabus

Skoltech

Идентификатор документа, задачи / ID: 481661 v.1, 453706

ДОКУМЕНТ ПОДПИСАН ПРОСТОЙ ЭЛЕКТРОННОЙ ПОДПИСЬЮ /
The document is signed with a simple electronic signature

Проректор по учебной работе / Dean of Education Столяров Денис Валерьевич / Stolyarov Denis Valerevich

Дата подписания / Date of signing 30.09.2026

Contact Person	Anastasia Tyagusova
Contact Person's E-mail	a.tyagusova@skoltech.ru
Course Title (in English)	Thesis Proposal
Course Title (in Russian)	План научно-исследовательской работы
Lead Instructor	-

1. Annotation

Course Description

Thesis Proposal is a thesis-related element that each second-year MSc student should pass in Term 5. The aim of Thesis Proposal is to formulate a concrete research topic, set its goal and objectives, study and formulate the state of the art and research problem, form and develop the general concept of research project, as well as plan and deadlines for its execution. The Thesis Proposal is a result of the Thesis Research Project work in Term 5. With this in mind, graded "pass", it coveres 3 credits + 3 credits for Thesis Research Project.

Аннотация

План научно-исследовательской работы - это элемент, непосредственно связанный с магистерской диссертацией, который должен пройти каждый магистр второго года обучения в 5 учебной четверти. Целью подготовки «Плана научно-исследовательской работы» является формулировка конкретной темы исследования, определение его целей и задач, формулировка исследовательской проблемы и изучение современного состояния науки в данной области, формирование и разработка студентом основной концепции научного исследования, плана и сроков его реализации в течение второго года обучения. «План научно-исследовательской работы» является результатом работыв рамках дисциплины "Научно-исследовательская работа. Преддипломная практика" в 5-м семестре. С учётом этого, при оценке «зачтено», «План научно-исследовательской работы» охватывает 3 кредита + 3 кредита за "Научно-исследовательская работа. Преддипломная практика" .

2. Basic Information

Course Academic Level	MSc
Number of ECTS credits	3

Course Prerequisites / Recommendations

Early Research Project, Industrial Immersion, Innovation Workshop

Type of Assessment Pass/Fail

Grading Scale

Pass: 60

Course Term (in context of Academic Year) Term 1

Students of Which Programs do You Recommend to Consider this Course as an Elective?

BSc Programs	Masters Programs	PhD Programs
	All Master Programs	

Maximum Number of Students

	Maximum Number of Students
Overall:	400
Per Group (for seminars and labs):	400

3. Course Content

Course contains Industry-oriented elements?

No

ECTS Credit System – Reference Tool

Total Number of ast. Hours in Your Course 81

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Thesis Proposal	formulate a concrete research topic, set its goal and objectives, study and formulate the state of the art and research problem, form and develop the general concept of research project, as well as plan and deadlines for its execution		10		71

4. Learning Outcomes

Please specify course intended learning outcomes using Skoltech Learning Outcomes Framework.

1. FUNDAMENTAL KNOWLEDGE 1.1. KNOWLEDGE OF MATHEMATICS AND NATURAL SCIENCES

1.2. KNOWLEDGE OF APPLIED SCIENCE AND ENGINEERING SCIENCE INCLUDING CONTEMPORARY METHODS AND TOOLS

1.3. KNOWLEDGE OF INNOVATION AND ENTREPRENEURSHIP

2. PERSONAL AND GENERAL PROFESSIONAL SKILLS AND ATTRIBUTES:

2.1. COGNITION AND MODES OF REASONING

2.1.1. Analytical reasoning and problem solving

2.1.2. System thinking

2.1.3. Creative thinking

2.2. ATTITUDES AND LEARNING PROCESS

2.2.1. Initiative and the willingness to take appropriate risks

2.2.2. Willingness to make decisions in the face of uncertainty

2.3. ETHICS, EQUITY AND OTHER RESPONSIBILITIES

2.3.5. Proactive vision and intention in life

2.3.6. Commitment to social and professional behavior

3. INTERPERSONAL SKILLS

3.1. COMMUNICATIONS IN INTERNATIONAL ENVIRONMENTS

3.1.3. Oral presentation and discussion

3.1.6. Effective interaction in different cultural and international settings

3.2. TEAMWORK AND LEADERSHIP

3.2.2. Team operations and project management

4. LEADING THE INNOVATION PROCESS

4.2. VISIONING — INVENTING NEW TECHNOLOGIES THROUGH RESEARCH

4.2.2. Basic research leading to new scientific discovery

4.2.3. Research aimed at developing new technologies

4.2.4. Imagining utility of new science and technology

4.3. VISIONING — CONCEIVING AND DESIGNING SUSTAINABLE SYSTEMS

	4.3.1. Identifying stakeholders need and wants
	4.3.2. Identifying and formulating objectives and goals
	4.3.3. Conceiving and architecting products and services around new technologies and identifying their impact
	4.3.5. Understanding the technical context and ecosystem of the product or service
4.4. DELIVERING ON THE VISION — IMPLEMENTING AND OPERATING	4.4.1. Designing and optimizing sustainable and safe implementation and operations
	4.4.4. Implementation and operations management
4.5. DELIVERING ON THE VISION — ENTREPRENEURSHIP AND ENTERPRISE	4.5.7. Managing intellectual property and respecting the legal process

5. Assignments and Grading

In-person Attendance Requirement 100

Assignment Type	Assignment Summary	% of Final Course Grade
Report	Thesis Proposal: 1)Working Title 2)Description of a background and problem set 3) Description of the purpose and definitions of the thesis project; outline of of specific aims by which the work is intended to accomplish the objectives 4) Preliminary literature review/information retrieval 5) Draft work plan 6) List of References	100

6. Assessment Criteria

Select Assignment 1 Type Report

Input Sample of Assignment 1 or Share a Link to Assignment 1

Thesis Proposal:
1)Working Title
2)Description of a background and problem set
3) Description of the purpose and definitions of the thesis project; outline of of specific aims by which the work is intended to accomplish the objectives
4) Preliminary literature review/information retrieval
5) Draft work plan
6) List of References

Assessment Criteria for Assignment 1

1. Student formulates a succinct but indicative working title.
2. Student describes background and sets the research problem. Student clarifies the reasons for the

choice of the thesis project topic.
3. Student describes the goal and aims of the thesis project and outlines a set of specific steps to accomplish.
4. Student outlines a preliminary literature review/information retrieval that provides context and related literature for the thesis project.
5. Student drafts a work plan that outlines the sequencing, flow, resources, and timeline of the thesis project.
6. Student provides a list of accurately and correctly cited references

7. Textbooks and Internet Resources

You can request at most two required textbooks. Additionaly, you can suggest up to nine recommended textbooks.

Required Textbooks	ISBN-13 (or ISBN-10)
anything required by the supervisor	
Policy on State Final Attestation https://lms.skoltech.ru/courses/2072/files/folder/2.%20MSc/Research/MSc%20Thesis%20Project?preview=28878	

8. Facilities

9. Additional Notes

Free Style Comments (if any)

For students of the Startup-as-Thesis track, the Thesis Proposal may be covered as part of the Expert Panel Meeting presentation in October (if any) of the second year of study.The grading structrure will be different: thesis proposal(text) 50% + oral presentation with slides (50%). The thesis proposal (text) requirements are the same. The presentation requirements are listed below:
SAT Thesis Prpoosal Presentation:
1. State of the Art and Research Problem
2. Technology
3. How Does the Project Solve the Described Problem
4. Roadmap and Progress
5. Goal and Objectives
6. Research Methodology
7. Project Team
8. Individual Contribution
9. Business opportunity, business model
10. Workplan
11. SAT Project Status
1. The Technology / Product Development Part:
• Proposed technology / product description
• Proposed individual research problem, scientific basis for the individual research
(context for the thesis project is provided, connection between research and innovation described, importance and potential described, reasons for the choice of the thesis project described)
• The individual scientific aim and objectives
(specific objectives for reaching the individual research goal outlined, e.g. hypotheses to be tested or technology to be developed)
• Current individual research progress and personal outcome
• Individual research plan
(individual research sequencing, flow and timeline outlined)
5 – excellent
4 – good

3 – satisfactory
2 – unsatisfactory
1 – no evidence
2. Individual student's scientific contribution to Startup Project:
5 – excellent
4 – good
3 – satisfactory
2 – unsatisfactory
1 – no evidence
3. Established Startup Project team expertise, roles and responsibilities:
5 – excellent
4 – good
3 – satisfactory
2 – unsatisfactory
1 – no evidence
4. The Entrepreneurial Part:
- Applied real-world problem to be solved
- Potential end users
- Current competitive solutions and their drawbacks
- Competitive advantage of your solution
- Expected impact of the proposed technology / product
- Startup project key milestones for coming 3, 6, 12 months

5 – excellent
4 – good
3 – satisfactory
2 – unsatisfactory
1 – no evidence
5. Application for financial support submitted:
yes no not stated

6. Comments

_____

7. Final Resolution:
- Recommend a Startup Project as Thesis for preparation and defense at the SFA;
- Do not recommend a Startup Project as Thesis for preparation and defense at the SFA;
- Recommend to rework the Startup Project as Thesis for elimination of mentioned deficiencies.

Is this syllabus complete?	Yes, the syllabus is a final draft waiting for approval by Education Department
The proposed course 1) has explicit academic content and requirements for receiving credits, 2) is in alignment with the program's learning outcomes, 3) adheres to policies and Skoltech regulations.	Lead Instructor confirms
Syllabus status	Approved by the Education Department

Course Syllabus

Skoltech

Идентификатор документа, задачи / ID: 481661 v.1, 453706

ДОКУМЕНТ ПОДПИСАН ПРОСТОЙ ЭЛЕКТРОННОЙ ПОДПИСЬЮ /
The document is signed with a simple electronic signature

Проректор по учебной работе / Dean of Education Столяров Денис Валерьевич / Stolyarov Denis Valerevich

Дата подписания / Date of signing 30.09.2026

Contact Person	Anastasia Tyagusova
Contact Person's E-mail	a.tyagusova@skoltech.ru
Course Title (in English)	Predefense
Course Title (in Russian)	Предзащита
Lead Instructor	-

1. Annotation

Course Description

Pre-defense is a thesis-related element that each second-year MSc student should pass during Term 8. The aim of pre-defense is to present the final output - the research project including manuscript and presentation. The thesis draft provided in term 7 is a pre-requisite for students to be able to present the results of their MSc thesis research at a Pre-defense. For students of the Startup-as-Thesis track, the Pre-defense is organized together with and within the same requirements as for regular-track students with participation of the Skoltech Center of Entrepreneurship & Innovation

Аннотация

Предзащита - это элемент, непосредственно связанный с магистерской диссертацией, который должен пройти каждый магистр второго года обучения в 8 учебной четверти. Целью предзащиты является представление студентами окончательных результатов реализации плана научного исследования в виде доклада и текста магистерской диссертации. Драфт диссертации, предоставляемый в 7 четверти, является обязательным условием для того, чтобы студенты могли представить результаты своего исследования по магистерской диссертации на предзащите. Для студентов трека «Стартап как диплом» предзащита организуется совместно и в соответствии с теми же требованиями, что и для студентов обычного трека, с участием Центра предпринимательства и инноваций Сколтеха.

2. Basic Information

Course Academic Level	MSc
Number of ECTS credits	3

Course Prerequisites / Recommendations

Early Research Project, Industrial Immersion, Innovation Workshop, Thesis Proposal, Thesis Status Report, Thesis Draft

Type of Assessment	Pass/Fail

Grading Scale

Pass: 60

Course Term (in context of Academic Year) Term 4

Students of Which Programs do You Recommend to Consider this Course as an Elective?

BSc Programs	Masters Programs	PhD Programs
	AI Robotics Advanced Computational Science Advanced Manufacturing Technologies Applied Computational Mechanics Applied Photonics and Optical Information Systems Data Science Digital Electrical Energy Energy Systems Engineering Systems Internet of Things and Wireless Technologies Life Sciences Materials Science Mathematical and Theoretical Physics Next Generation Communication Technologies Petroleum Engineering Photonics and Quantum Materials Technological Entrepreneurship and Innovative Business Development	

Maximum Number of Students

	Maximum Number of Students
Overall:	400
Per Group (for seminars and labs):	400

3. Course Content

Course contains Industry-oriented elements?

No

ECTS Credit System – Reference Tool

Total Number of ast. Hours in Your Course 81

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Predefense	to present the final output - the research project including manuscript and presentation		20		61

4. Learning Outcomes

Please specify course intended learning outcomes using Skoltech Learning Outcomes Framework.

1. FUNDAMENTAL KNOWLEDGE

- 1.1. KNOWLEDGE OF MATHEMATICS AND NATURAL SCIENCES
- 1.2. KNOWLEDGE OF APPLIED SCIENCE AND ENGINEERING SCIENCE INCLUDING CONTEMPORARY METHODS AND TOOLS
- 1.3. KNOWLEDGE OF INNOVATION AND ENTREPRENEURSHIP

2. PERSONAL AND GENERAL PROFESSIONAL SKILLS AND ATTRIBUTES:

2.1. COGNITION AND MODES OF REASONING

- 2.1.1. Analytical reasoning and problem solving
- 2.1.2. System thinking
- 2.1.3. Creative thinking

2.2. ATTITUDES AND LEARNING PROCESS

- 2.2.1. Initiative and the willingness to take appropriate risks
- 2.2.2. Willingness to make decisions in the face of uncertainty

2.3. ETHICS, EQUITY AND OTHER RESPONSIBILITIES

- 2.3.5. Proactive vision and intention in life
- 2.3.6. Commitment to social and professional behavior

3. INTERPERSONAL SKILLS

3.1. COMMUNICATIONS IN INTERNATIONAL ENVIRONMENTS

- 3.1.3. Oral presentation and discussion
- 3.1.5. Communications in English in scientific, business and social settings
- 3.1.6. Effective interaction in different cultural and international settings

3.2. TEAMWORK AND LEADERSHIP

3.2.2. Team operations and project management

4. LEADING THE INNOVATION PROCESS

4.2. VISIONING — INVENTING NEW TECHNOLOGIES THROUGH RESEARCH

4.2.2. Basic research leading to new scientific discovery

4.2.3. Research aimed at developing new technologies

4.2.4. Imagining utility of new science and technology

4.3. VISIONING — CONCEIVING AND DESIGNING SUSTAINABLE SYSTEMS

4.3.1. Identifying stakeholders need and wants

4.3.2. Identifying and formulating objectives and goals

4.3.3. Conceiving and architecting products and services around new technologies and identifying their impact

4.3.5. Understanding the technical context and ecosystem of the product or service

4.4. DELIVERING ON THE VISION — IMPLEMENTING AND OPERATING

4.4.1. Designing and optimizing sustainable and safe implementation and operations

4.4.4. Implementation and operations management

4.5. DELIVERING ON THE VISION — ENTREPRENEURSHIP AND ENTERPRISE

4.5.7. Managing intellectual property and respecting the legal process

5. Assignments and Grading

In-person Attendance Requirement 100

Assignment Type	Assignment Summary	% of Final Course Grade
Predefense	Presentation is to be submitted in Canvas. The format is different for regular- and Startup-as-thesis-track students. The Committee assesses both the oral presentation with slides and the thesis draft	100

6. Assessment Criteria

Select Assignment 1 Type

Predefense

Input Sample of Assignment 1 or Share a Link to Assignment 1

Pre-defense presentation for regular-track students:
https://lms.skoltech.ru/courses/2072/files/folder/2.%20MSc/Research/MSc%20Thesis%20Project/03.%20MSc%20Thesis%20Manuscript%20Guidelines?preview=277129

for Startup-as-thesis-track students:

https://lms.skoltech.ru/courses/2072/files/folder/2.%20MSc/Research/MSc%20Thesis%20Project/03.%20MSc%20Thesis%20Manuscript%20Guidelines?preview=375099

Assessment Criteria for Assignment 1

Pre-defenses:
1. Research problem: the problem is relevant to contemporary science demands; the goal and aims are clear and well; defined; project plan is consistent and meets the goal
2.Research methods: techniques and methods are selected and applied correctly; limitations and accuracy of methods applied were considered and described
3. Data collection and analysis: all results collected are sufficient for the project goal and aims; all results are recorded and described correctly; all results are critically evaluated
4.Conclusions and recommendations: conclusions reflect the aim of the project and all tasks; conclusions are correct, do not contradict and do not overstate the results
5. Practical Application and Innovation: the project suggests practical application of the results obtained; the innovation includes novelty of the proposed product/service/technology or process, meaningfulness and significance of the resulting business and/or social impact, competitive advantage, commercialization potential.
6. Manuscript: written text comprises logical and coherent presentation of ideas; all parts are balanced and contribute to strengthen the aim of research; appropriate and diverse grammatical structures and academic vocabulary; manuscript consistently follows a chosen style of citing and referencing.
7. Oral presentation and defense: slides are organized perfectly; all information on slides is correct, no mistakes; student demonstrates fluency within a context; student speaks very confidently and clearly, maintain excellent engagement; all answers are correct and full (Q&A session)

7. Textbooks and Internet Resources

You can request at most two required textbooks. Additionaly, you can suggest up to nine recommended textbooks.

Required Textbooks	ISBN-13 (or ISBN-10)
anything required by the supervisor	
Policy on State Final Attestation: https://lms.skoltech.ru/courses/2072/files/folder/2.%20MSc/Research/MSc%20Thesis%20Project?preview=28878	

Recommended Textbooks	ISBN-13 (or ISBN-10)
MSc Thesis Guidelines & Pre-Defense Templates: https://lms.skoltech.ru/courses/2072/files/folder/2.%20MSc/Research/MSc%20Thesis%20Project/03.%20MSc%20Thesis%20Manuscript%20Guidelines	

8. Facilities

9. Additional Notes

Is this syllabus complete?

Yes, the syllabus is a final draft waiting for approval by Education Department

The proposed course 1) has explicit academic content and requirements for receiving credits, 2) is in alignment with the program's learning

Lead Instructor confirms

outcomes, 3) adheres to policies and Skoltech regulations.

Syllabus status

Approved by the Education Department

Skoltech

Идентификатор документа, задачи / ID: 489306 v.1, 466030

ДОКУМЕНТ ПОДПИСАН ПРОСТОЙ ЭЛЕКТРОННОЙ ПОДПИСЬЮ / The document is signed with a simple electronic signature

Проректор по учебной работе / Dean of Education Столяров Денис Валерьевич / Stolyarov Denis Valerevich

Дата подписания / Date of signing 27.10.2026

Course Syllabus

Course Title	Short-Term Project
Course Title (in Russian)	Исследовательский проект
Lead Instructor	-

1. Annotation

Course Description

Short-Term Project is one of educational elements of Stream 5. "Options" of MSc curriculum. Depending on the Program, this element might be a compulsory or elective one. This is a practical oriented course.

During Short-Term Project students are expected to work on a research project not related to Thesis. In case students would like to work on research project related to Thesis, they should register for another educational element - Additional Thesis Research.

By the end of the course, students should submit a report on completed work and Research Supervisor should grade it.

1st-year MSc students can register for this course in exceptional cases only. This should be confirmed with both Program Director and Research Supervisor.

2nd-year MSc students can register for this course in Terms 5, 6 & 7 themselves without any additional approval. In Term 8 students can not register for this course, as they should be mainly concentrated on their Thesis defense.

Course Description (in Russian)

Исследовательский проект - это один из учебных элементов Модуля 5. "Индивидуальное обучение студента" учебного плана магистратуры. В зависимости от программы этот учебный элемент может быть обязательным или элективным. Этот курс является практиориентированным.

Исследовательский проект подразумевает работу студентов над исследовательским проектом, не связанным с темой ВКР. Для исследовательских проектов, связанных с темой ВКР, студентам необходимо регистрироваться на иной учебный элемент - Исследовательский семинар.

По завершении работы студенты представляют отчет о проделанной работе, который оценивает научный руководитель студента.

Студенты магистратуры первого года обучения могут зарегистрироваться на Исследовательский проект в исключительных случаях по согласованию с Директором программы и научным руководителем.

Студенты магистратуры второго года обучения могут зарегистрироваться на Исследовательский проект без дополнительного согласования в учебных семестрах 5, 6 и 7. В 8 учебном семестре брать данный курс не разрешается, поскольку студенты должны быть полностью сконцентрированы на подготовке к защите ВКР.

2. Basic Information

Course Academic Level MSc

Number of ECTS credits 3/ 6/ 9

Course Prerequisites / Recommendations

-

Type of Assessment Pass/Fail

Mapping from grades to percentage:

Pass: 60

Term Terms 5, 6 & 7

Students of Which Programs do You Recommend to Consider this Course as an Elective?

BSc Programs	Masters Programs	PhD Programs
	All Master Programs	

Maximum Number of Students

	Maximum Number of Students
Overall:	
Per Group (for seminars and labs):	300

3. Course Content

Topic	Summary of Topic	Contact Hours: Lectures	Contact Hours: Seminars	Contact Hours: Labs	Non-contact Hours: Student's Independent Study
Project planning	Students plan a project.		3		9
Project execution	Students work on scientific project.			24	31
Preparation of report + project defense	Students prepare written report and presentation on completed work.		4		10

4. Learning Outcomes

Skoltech Learning Outcomes are indicated as per Skoltech Learning Outcomes Framework.

1. FUNDAMENTAL KNOWLEDGE

1.2. KNOWLEDGE OF APPLIED SCIENCE AND ENGINEERING SCIENCE INCLUDING CONTEMPORARY METHODS AND TOOLS

1.3. KNOWLEDGE OF INNOVATION AND ENTREPRENEURSHIP

2.1. COGNITION AND MODES OF REASONING

2.1.2. System thinking

2.1.5. Critical thinking and meta-cognition

4.2. VISIONING — INVENTING NEW TECHNOLOGIES THROUGH RESEARCH

4.2.2. Basic research leading to new scientific discovery

4.2.3. Research aimed at developing new technologies

5. Assignments and Grading

Physical Attendance Requirement (% of classes) 100

Assignment Type	Assignment Summary	% of Final Course Grade
Report	Project planning, project execution and project report on completed work submitted via Canvas. Recommended format of defense is presentation.	100

6. Assessment Criteria

Assignment 1 Type Report

Sample of Assignment 1

Project report - a file in a free form (it can be any result of your project: a presentation, an article, etc.) Discuss with your supervisor a form of report.

Assessment Criteria for Assignment 1

1 - The student identifies the goal within a context, develops and justifies the focus on the area of interactions and provides a coherent account how to achieve this goal. The development of the project is totally consistent with the description.
2 - The student selects and applies appropriate techniques and methods correctly for the project and analyzing novel situations.
3 - The student draws relevant, valid, appropriate and critically evaluated conclusions reflected the aim and all tasks of the project.
4 - The student identifies the goal within a context, develops and justifies the focus on the area of interactions and provides a coherent account how to achieve this goal. The development of the project is totally consistent with the description.

7. Textbooks and Internet Resources

You can request at most two required textbooks. Additionaly, you can suggest up to nine recommended

textbooks.

Required Textbooks	ISBN-13 (or ISBN-10)
-	

8. Facilities

9. Additional Notes

Comments

If you have any questions regarding any of the points above, please send your inquiries to Education Helpdesk (Jira):
- Educational Process (Links to an external site.) - Research Projects: MSc - for short-term research/E&I projects questions (not connected to Thesis);
- MSc Thesis Project (Links to an external site.) - for Thesis-related questions (Thesis proposal, Thesis titles...).

*) in clause 3 "Course content" we've provided hours for a 3-credit course. If a student takes a 6-credit course, his/her workload is doubled respectively, and so on.

The proposed course 1) has explicit academic content and requirements for receiving credits, 2) is in alignment with the program's learning outcomes, 3) adheres to policies and Skoltech regulations.

Lead Instructor confirms