

# Skoltech PhD in Materials Science and Engineering program

March 2020

## Description

The Skoltech Ph.D. program in Materials Science and Engineering is the interdisciplinary program that covers the competences at the junction of fundamental physics, chemistry, chemical and mechanical engineering. Its main goal is to educate in the fundamental principles and modern applications of the physico-chemical design, synthesis and characterization of the materials for applications in energy as alternatives sources and storages, modern electronics, catalysis and other technologies. The program also seeks to target industrial methods of materials production and preparation, design, testing and quality control of the technological equipment, complex assessment of material properties and demands for materials underpinning emerging technologies.

## Structure

### Courses (minimum requirement 30 ECTS):

#### General Doctoral Courses

Philosophy of Science, Technology and Innovation (6 ECTS)

Pedagogy (3 ECTS)

Innovation Studies (6 ECTS);

Research Methodology (3 ECTS)

English (3 ECTS) [required for aspirantura, optional for Ph.D.]

#### Advanced Major-Field Courses (12 ECTS)

### Research (207 ECTS), including

Thesis proposal defense (6 ECTS)

Qualifying Exam (3 ECTS)

Thesis Defense (6 ECTS)

### Pedagogical activities (3 ECTS)

## Course portfolio

Course	Status	ECTS	Instructor	Term
<b>Electrochemistry: Fundamentals to Applications</b>	<b>Advanced Major-Field</b>	<b>6</b>	<b>Keith Stevenson</b>	<b>4</b>
<b>Organic Materials for Electronics, Photonics, Energy Generation and Storage</b>	<b>Advanced Major-Field</b>	<b>6</b>	<b>Pavel Troshin</b>	<b>3</b>
<b>Materials Structure Characterization Methods</b>	<b>Advanced Major-Field</b>	<b>6</b>	<b>Artem Abakumov</b>	<b>3</b>
<b>Computational Chemistry and Materials Modeling</b>	<b>Advanced Major-Field</b>	<b>6</b>	<b>Andriy Zhugayevych</b>	<b>2</b>
Materials Chemistry	Basic Major-Field	6	Keith Stevenson	2
Structure and Properties of Materials	optional	6	Artem Oganov	3

Carbon Nanomaterials	optional	6	Albert Nasibulin	4
Mathematics and Machine Learning for Molecular Modelling	optional	3	Alexander Shapeev	4
Advanced Aerosol Science and Technology	optional	6	Albert Nasibulin	2
Nanocomposites	optional	6	Sergey Abaimov/ Stepan Lomov	3
Research Seminar "Advanced Materials Science"	optional	0.43 per term	Keith Stevenson	2-4
Computational Materials Science Seminar	optional	0.75 per term	Dmitry Aksenov	1-4
Energy PhD Seminar	Research methodology	3	Alexei Buchachenko	2-4

### **PhD Thesis minimum requirements**

Minimum of two articles published or accepted for publication in scientific international journals indexed in WoS or Scopus. All Ph.D. graduates also require to present their research results in minimum of two reputable international conferences (Publication in conference proceedings). Reputability is judged by Thesis Supervisor in consultation with Individual Doctoral Committee.

### **PhD Program Committee**

Keith Stevenson  
Artem Abakumov  
Pavel Troshin  
Andriy Zhugayevych  
Sergei Tretyak  
Albert Nasibulin  
Alexei Buchachenko (Chair)  
Sergey Abaimov

### **PhD Supervisors**

Keith Stevenson CEST  
Artem Abakumov CEST  
Pavel Troshin CEST  
Andriy Zhugaevich CEST  
Artem Oganov CEST  
Albert Nasibulin CPQM  
Alexei Buchachenko CEST  
Sergey Abaimov CDMM  
Alexander Shapeev CEST

Timofei Zatsepin CLS  
Evgeny Antipov CEST  
Sergey Levchenko CEST  
Victoria Nikitina CEST  
Stanislav Fedotov CEST