https://crei.skoltech.ru/ cest/education/material s-science-program

Prof. Dmitry Aksyonov (program coordinator) Prof. Stanislav Fedotov (program director) Aug 31, 2023 Orientation Day



Materials Science M.Sc. Program

hosted by Center for Energy Science and Technology



Inorg. Chem. 2021, 60, 12237-12246

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Where to get information

Important links:

- Program page: <u>crei.skoltech.ru/cest/education/materials-science-</u>
 <u>program</u>
- Academic calendar: www.skoltech.ru/en/education/academic-calendar/msc-academic-calendar-2023-2024
- Curriculum: https://box.skoltech.ru/index.php/s/1qnB0YojN0o9yNp
- Course catalog: <u>www.skoltech.ru/en/education/course-catalog</u>
- Course schedule: <u>schedule.skoltech.ru</u>
- Course enrollment and study: <u>skoltech.instructure.com</u>

Where to get information

Whom to ask:

- Your research advisor
- Education Office
- Program team:





Program Coordinator **Dmitry Aksenov** Computational track

Program Assistant **Ekaterina Guseva** Technical issues

Program Director Stanislav Fedotov Experimental track



CEST Director Artem Abakumov

Courses

 Materials Chemistry (Term 18 Materials Characterization Te Crystal Structure Investigation 	Compulsory courses 3) chniques (Term 2) n Methods (Term 3)	
 Materials Science (experiment) Crystal Chemistry Electrochemistry Catalysis Organic Materials for Energy Thermodynamics of Materials 	 Materials Engineering (experiment) Carbon Nanomaterials Applied Materials and Design (Structural materials) Design of Chemical Sensors Aerosol Science and Technology 	Computational Materials Science • Computational Chemistry & Materials Modeling • Advanced Materials Modeling • Structure and Property of Materials (Modeling perspective) • Numerical modelling • High Performance Python Lab

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Course selection for Term 1 and Term 2

	Experimental tracks - credits	Computational track - credits
Term 1b - Term 4	1. Seminar "Advanced Materials Science" - 3 biweekly	 Computational Materials Science seminar - 3 total, bymonthly Seminar "Advanced Materials Science" - 3 total, biweekly
Term 1b October	 Materials Chemistry - 3 Soft Condensed Matter - 3 or Mathematics for Engineers - 3 	 Materials Chemistry - 3 Quantum Mechanics - 3 or Mathematics for Engineers - 3
Term 2 November- December	 Materials Characterization Techniques - 6 Crystal Chemistry - 3 Materials Selection in Design - 3 or Aerosol Science and Technology - 6 or Introduction to Solid State Physics - 6 	 Computational Chemistry & Materials Modeling - 6 Introduction to Solid State Physics - 6 or High Performance Python Lab - 3 Crystal Chemistry - 3

1 credit - 27 astronomical hours; A 6-credit course is 9 hours of classes per week, 8 weeks, i.e 72 hour in class, the rest is homework

Instructors and Supervisors



Artem Abakumov Full Professor, Director



Evgeny Antipov Full Professor



Alexei Buchachenko Full Professor



Dmitry Gorin Full Professor



Stanislav Fedotov Assistant Professor

Victoria Nikitina Assistant Professor

Dmitry Aksyonov Assistant Professor



Sergey Luchkin **Research Scientist**



Aleksandra Savina Research Scientist



Sergey V. Levchenko Assistant Professor

Olga Shmatova

Research Scientist

Artem R. Oganov Full Professor



Alexander Shapeev Associate Professor



Albert Nasibulin Full Professor





Dmitry Krasnikov Assistant Professor







Fedor Fedorov Assistant Professor



Stanislav Evlashin Senior Research Scientist

Gleb Sukhorukov

Visiting Professor

6

Research at Materials Science Track



- Artem Abakumov 1. Materials for energy conversion Full Professor, Director and storage
 - 2.Scalable synthesis technologies
 - 3. Electron microscopy
 - 4.Crystallography5.inorganic solid state chemistry



Evgeny Antipov Full Professor Material Science and Inorganic Chemistry
 Electrochemistry



Stanislav Fedotov Assistant Professor

 Material Science and Solid State Chemistry
 Metal Ion Batteries



Victoria Nikitina Assistant Professor

1.Electrochemistry 2.Electrochemical Material Science



Glove box line I



Hydrothermal synthesis



Microscopy



Battery prototype

Research at Materials Engineering Tanarcaterials Lab:





Dmitry Krasnikov Assistant Professor



 Synthesis of nanomaterials (CNTs, graphene);
 Flexible, stretchable and transparent electronics;
 Photodectors/photonic crystals;
 Hybrid solar cells;
 Fiber lasers/saturable absorber;
 Electronic nose;
 Materials for energy transitions.

Digital materials engineering Lab:



1.Digital design,
synthesis, structure and
properties of aerospace
materials
2.Development X-ray and
microscopy methods
3.Bioinspired materials
4.Digital twins of
materials (bones,
muscles, brain phastorite)ch

Research at Materials Science Track



Sergey V. Levchenko Computational study of catalysis



Alexander Shapeev Associate Professor Development of interatomic potentials



Artem R. Oganov Computational prediction of Full Professor new materials

Dmitry Aksyonov Assistant Professor

Computational study of battery materials



Alexei Buchachenko Full Professor

Assistant Professor

Theoretical materials science



Industry-Oriented **Computational Discovery**

HPC infrastructure:

- Arkuda (2024 cores)
- Pardus (628 cores)
- Magnus CEST cluster (224 cores)
- and more in groups



Software:

- VASP, Quantum Espresso, Abinit
- MLIP
- USPEX
- SIMAN (in-home developed code) https://github.com/dimonaks/siman/wiki



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2023-2024 MSc-1 Academic Calendar

www.skoltech.ru/en/edu

cation/academic-

calendar/msc-academic-

calendar-2023-2024

				A	lug-2	23			August		
		М	Tu	w	Th	F	Sa	Su			
			1	2	3	4	5	6			
		7	8	9	10	11	12	13			
		14	15	16	17	18	19	20	Orientation course		
		_21	22	23	24	25	26	27			
		-28	-29	30	31				31 Aug - Orientation Q&A session		
			_		on f	22			Term 14 (IMI): 04 29 Sentember		
			To	-	sep-z	-0 F	6.	Cu.	Term TA (IW). 04 - 29 September		
		IVI	Tu			1	2	3	01 Sep - IW Opening Ceremony		
Week 1	IW	4	5	6	7	8	9	10	or oup intropoling continuity		
Week 2	IW	11	12	13	14	15	16	17			
Week 3	IW	18	19	20	21	22	23	24	Week of 18 Sep: Registration for Term 1B		
Week 4	IW	25	26	27	28	29	30				
				. (Oct-2	23			Term 1B: 02 - 27 October		
		М	Tu	w	Th	F	Sa	Su			
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Week 1	C	2	3	4	5	6	1	8	Drop/Add period for Term 1B: 02 - 08 Oct		
Week 3	c	16	17	18	19	20	21	22	18 Oct: Industry Day		
Week 4	E	23	24	25	26	27	28	29	To ool. maaday bay		
		- 30	31								
				Ν	lov-2	23			Term 2: 30 October - 22 December		
		М	Tu	w	Th	F	Sa	Su			
Week 1	С			1	2	3	4	5	Drop/Add period for Term 2: 30 Oct - 05 Nov		
Week 2	С	6	7	8	9	10	11	12	Public Holiday: 06 Nov		
Week 3	С	13	14	15	16	17	18	19			
Week 4	C	20	21	22	23	24	25	26			
vveek o	C	21	28	29	30						
		_	_			12			Term 2: 20 October 22 December		
			Ter	144	Jec-2	23 F	6.	Cu	Term 2: 30 October - 22 December		
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Week 6	С	4	5	6	7	8	9	10			
Week 7	E	11	12	13	14	15	16	17			
Week 8	Е	18	19	20	21	22	23	24	Week of 18 Dec: Registration for Winter Term		
	VAC	25	26	27	28	29	30	31			
	IW	Innov	ation	Works	shop						
	c	Credi	t-bear	ing ac	tivity (course	e, rese	arch)			
	E	Evalu	ation	period	I (asse	ssme	nt and	applic	ation period)		
	IND	Indep	ender trial In	nmore	ion	pone					
	VAC	Vacat	tion	i i i i i i i i i							
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		1		J	an-2	24			Winter Term: 08 - 26 January
		М	Tu	w	Th	F	Sa	Su	
	VAC	1	2	3	4	5	6	7	
/veek 1	ISP	8	9	10	11	12	13	14	Independent Studies Perios (ISP)
week 2	ISP	15	16	17	18	19	20	21	Week of 15 Jan: Registration for Term 3
Neek 4	C	22	23	24	25	26	27	28	Mig-Jan. DEADLINE to name MS research advisor
WORK 1	C	23	30	31					proprinte period for renn 5. 29 Jan - 04 Peb
				F	eb-2	24			Term 3: 29 January - 22 March
		М	Tu	w	Th 1	F	Sa	Su	Drop/Add period for Term 3: 29 Jan - 04 Eah
Neek 2	C	5	6	7	8	9	10	11	Engrade period for renning, 29 Jan - 04 Feb
Neek 3	c	12	13	14	15	16	17	18	from companies and self-initiated by students
Neek 4	С	19	20	21	22	23	24	25	Public Holidays: 23 Feb
Neek 5	С	26	27	28	29				
				N	lar-	24			Term 3: 29 January - 22 March
		М	Tu	w	Th	F	Sa	Su	
						1	2	3	Week of 04 March: Registration for Term 4
Neek 6	С	4	5	6	7	8	9	10	Public Holidays: 08 March
Week 7	E	11	12	13	14	15	16	17	End of March: Deadline for a self-initiated projects
/veek 8	E	18	19	20	21	22	23	24	and companies proposals
week 1	C	20	20	21	26	29	30	31	Dropwad period for Term 4: 25 - 51 March
				A	pr-2	24			Term 4: 25 March - 31 May
	0	M	Tu	w	Th	F	Sa	Su	
Week 2	C	1	2	3	4	5	6	14	April - Mid-May: Students are intreviewd by companie
Neek 3	C	5 15	9	10	11	12	13	14	and assigned to industrial immersion projects
Neek 5	c	22	23	24	16	26	20	21	
	VAC	29	30		2.0	20		20	The spring break dates: 29 April - 12 May
						24			Torres 4: 25 Marcala 24 Marc
		M	Tu	W	Th	24 F	Sa	Su	Term 4: 25 March - 31 May
	VAC			1	2	3	4	5	The spring break dates: 29 April - 12 May
	VAC	6	7	8	9	10	11	12	
Neek 6	С	13	14	15	16	17	18	19	Week of 13 May: Registration for Summer Term
Week 7	E	20	21	22	23	24	25	26	
Veek 8	E	27	28	29	30	31			
				J	un-2	24			Summer Term: 03 June - 26 July
		М	Tu	w	Th	F	Sa	Su	
Nook 1	IND	2			6	7	1	2	Industrial Immercian
Nook 2	IND	3	4	5	12	14	8	9	Public Holidays 12 June
Neek 3	IND	17	18	19	20	21	22	23	r uping monidaly. 12 Julie
Neek 4	IND	24	25	26	27	28	29	30	
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		M	Tu	W	Th	4 F	50	Su	Summer Term: 03 June - 26 July
Neek 5	IND	1	2	3	4	5	6	7	Industrial Immersion
Neek 6	IND	8	9	10	11	12	13	14	
Neek 7	IND	15	16	17	18	19	20	21	
Neek 8	IND	22	23	24	25	26	27	28	
	VAC	29	30	31					
				A	ug-	24			Vacation: 29 July - 30 August
	140	М	Tu	w	Th	F	Sa	Su	
	VAC			7	1	2	3	4	
	VAC	5	12	14	8	9	10	11	
	1/00		- 12	14	10	10	11	10	
	VAC	10	20	21	22	22	24	25	Late Aug: Degistration for Term 5 for MSc 2
	VAC	19 26	20	21	22	23	24	25	Late Aug: Registration for Term 5 for MSc-2

Choose company for industrial immersion by 31st of March

Choose Uni and research group for academic mobility contest by 31st of August