

哈爾濱工業大學基礎學科人才培養國際暑期學校

哈爾濱工業大學坐落於“盛夏避暑天堂”的冰城夏都哈爾濱市，2023 年夏季學期將繼續舉辦不同主題、特色鮮明的線上國際暑期學校，分別聯合各自領域國際知名教授，講授專業前沿知識，與來自國內外優秀本科生探究學術前沿問題，在專業熱門領域進行探討交流、合作創新。

哈爾濱工業大學基礎學科人才培養國際暑期學校項目，詳細資訊詳見附件：

報名及有關事宜：

- 1.每名學生只能報名參加壹個項目，全程英文授課；
- 2.請於 2023 年 5 月 11 日 12 點前將報名參加學生的電子照片（正面、免冠、由於出具正式成績單，若不需要成績單可不提供）及學生報名匯總表（附件 2）電子版發至 zhangquan@hit.edu.cn；
- 3.報名截止後，各主題項目負責教師會通過建立 QQ 群或微信群組方式直接通知學生後續上課事宜，請在報名時至少提供微信或 QQ 一種線上通訊方式；
4. 聯絡人：張全、zhangquan@hit.edu.cn。

附件：1. 哈爾濱工業大學基礎學科人才培養國際暑期學校課程
2. 哈爾濱工業大學基礎學科人才培養國際暑期學校報名匯總表

哈爾濱工業大學港澳臺辦公室

2023 年 4 月 18 日

INTERNATIONAL SUMMER SCHOOL
ADVANCED MATERIALS AND STRUCTURES IN SPACE VEHICLES

Jul 3rd – Jul 20th, 2023

Harbin Institute of Technology, Harbin, P.R. China

GENERAL INFORMATION

The summer school of Advanced Materials and Structures in Space Vehicles high-lights Mechanics, as a basic science, in the development of high-end aerospace technologies. Renowned scholars from Russia, America, Canada, Singapore and China are invited to introduce frontiers in mechanics and interdisciplinary fields, such as materials and astronautics. It offers students an opportunity to inspire interest, to spark innovation, to communicate and strengthen friendship with world-wide scientists and young investigators in mechanics and relevant fields in an international academic community.

ATTENDANCE REQUIREMENTS

Undergraduate or graduate attendees with background in mechanics, aerospace engineering, mechanical engineering, materials science, applied mathematics, etc. are welcomed. All participants must have a good command of English. Some courses/lectures will be given in Russian with translation in English.

COURSES AND LECTURES

The summer school offers a two-credit program consisting of three courses (code C1-C3), twelve seminar lectures (code L1-L12), and a sixteen-hour group research project. Lecturers and speakers are renowned scientists invited from world-famous universities and research institutes, such as Lomonosov Moscow State University (Russia), Samara State University (Russia), York University (Canada), Dalhousie University (Canada), Kentucky University (USA), National University of Singapore, and Harbin Institute of Technology (China). All experts will also act as instructors for group research projects.

(1) Courses

Lecturer	Institution	Topic	Units /code
Prof. V. V. Lyubimov	Samara State University, Russia	The effect of vibrancy and its external stability of unsymmetric space vehicles in atmosphere in the falling process	8 C1

Prof. A.B.Самсонов	Lomonosov Moscow State University, Russia	Dynamics and kinematic stability of multibody systems	8 C2
Prof. A.П.Алексеев	Samara State University, Russia	Design of aircraft structures	8 C3

(2) Lectures

Speaker	Institution	Topic	Units /code
Prof. B.M. Морозов	Lomonosov Moscow State University, Russia	Kinematic stability analysis of rigid flexible coupled orbiting spacecraft systems	2 L1
Prof. S.A. Chernyakin	Samara State University, Russia	Stability analysis of spacecraft orbit in coupled multi-fields	2 L2
Prof. A.V.Дорошин	Samara State University, Russia	Chaos and regular dynamics of gyro satellites under small perturbations	2 L3
Prof. Chengwei Qiu Dean's Chair Professor, NUS	National University of Singapore	Hybrid, spatiotemporal & topological thermotics	4 L4 L5
Prof. Baowen Li, Member, Academia Europaea	Southern University of Science and Technology	Thermal diode/thermal triode and thermal superstructural materials - the art of thermal control	4 L6 L7
Prof. Jianjun Gu Fellow, Canadian Academy of Engineering	Dalhousie University, Canada	Robots and artificial intelligence	2 L8
Prof. Bakhyt Alipova	University of Kentucky, USA	Compressible CFD: two methodologies for pipe flow of viscous fluids	4 L9 L10
Prof. Jinjun Shan	York University, Canada	Vibration control of flexible systems using input shaping	4 L11 L12

GROUP RESEARCH PROJECT

Participants will be grouped into teams to collaborate on research projects. Some basic data, digital models and computational tools will be provided. Each team should choose a topic for innovative research with knowledge gained in the courses and lectures. A partial list of areas covered in research projects is as follows: composites structural design and processing, design and control of unmanned aerial vehicles, nonlinear

dynamics and control of flexible trusses and beams, nonlinear dynamics of aerospace engine rotor systems, etc.

PROGRAM DATES AND TIMES

	Week 1						Week 2					
Unit	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
1-2	L1	L2	C2		Research	Tour	C3		L5	L12	Defense	Poster
3-4	L8	L6			Research				L10	Research		
5-6	C1		L4	L3	Research		L7	L9	Research	Defense preparation	Improve	
7-8			L11	Communication	Research		Research		Communication			

CONTACT INFORMATION

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INTERNATIONAL SUMMER SCHOOL

ENERGY STORAGE TECHNOLOGY UNDER DUAL-CARBON STRATEGY

Jul 3rd – Jul 16th, 2023

Harbin Institute of Technology, Harbin, P.R. China

GENERAL INFORMATION

Dual-carbon is the abbreviation of carbon peak and carbon neutrality. The national “dual-carbon” strategy advocates a green, environmentally friendly and low-carbon lifestyle. Accelerating the pace of reducing carbon emissions is conducive to guiding green technology innovation and improving the global competitiveness of industries and economies. China continues to promote the adjustment of industrial structure and energy structure, and vigorously develops renewable energy. China strives to reach the peak of carbon dioxide emissions by 2030, and strives to achieve the goal of carbon neutrality by 2060. Driven by today’s “dual-carbon” policy, it will have huge market prospects for the long-life, high-safety and low-cost power battery and the energy storage battery manufacturing technologies. The commercialization technology of fuel cells is a hot research spot to attract investment. Lithium-sulfur batteries and other new batteries have begun to arise, and electrocatalytic carbon dioxide conversion to higher value liquid chemicals, such as methanol, ethanol, acetic acid, formic acid, or compounds with higher carbon content, have rapidly become research hotspots as well. “Electrochemistry and the ‘Dual-Carbon’ Era” International Summer School focuses on the theme of “Electrochemical Theory and Technological Progress in Response to the ‘Dual-Carbon Strategy’” from Chinese government. Well-known experts in the scientific research area and CEO from industries are invited to focus on the cutting-edge technology of chemical power sources and the electrocatalytic technology in energy conversion. Through the summer school, it carries out lectures, enterprise visits, and host the “New Energy Materials Design and Application” innovation competition to provide

students with a platform for learning, communication and practice.

ATTENDANCE REQUIREMENTS

Undergraduate or graduate attendees with background in chemistry, chemical engineering, materials and engineering, energy storage and conversion related etc. are welcomed. All participants must have a good command of English. Some lectures will be given in English or Chinese with translation in English.

LECTURES AND TALKS

The summer school offers three lectures by Academicians and twelve seminars talks by Professors. Lecturers and speakers are invited from top institutions in Canada, Europe, Japan and China, including Énergie Matériaux Télécommunications Research Centre in Canada, Max Planck Institutes in Germany, Uppsala University, University of Calgary, The University of Tokyo, Chinese Academy of Sciences, Harbin Institute of Technology and CEO of the Vision. “New Energy Materials Design and Application” innovation competition and group study will also be performed every day.

Lecturers/ Speakers	Institution	Topics	Units
Shuhui Sun	Énergie Matériaux Télécommunications Research Centre	Development of Energy Storage and Conversion Technology	10
Mischa Bonn	Max Planck Institutes in Germany	Development and Application of Laser (Ultrafast) Spectroscopy	10
Jiefang Zhu	Uppsala University	Development and Breakthrough of Electrode Materials in Lithium-ion Battery	10
Venkataraman Thangadurai	University of Calgary	Development and Application of Solid Oxide Fuel Cell	10
Kazuhiro Takanabe	The University of Tokyo	Application of Heterogeneous Catalysis in Renewable Energy Conversion	10
Yanqiang Huang	Chinese Academy of Sciences-Dalian	Application and Development of Single-Atom Catalysts in Energy Storage and Conversion	4
Guanying Chen	Harbin Institute of Technology	Application Prospects of High Molecular Compounds in Carbon Neutrality	4
Huanong Zhang	CEO of the Vision	Opportunities and Challenges of Energy Storage Technology under the “Dual-Carbon Strategy”	4

Teams	HIT/Battery Companies	Innovation Competition: Design and Application of New Energy Materials	32
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GROUP RESEARCH PROJECT

Participants will be grouped into 6 teams or more, each with 8-9 members, to work on a project on new structural materials design and finish the experimental reports. Each group may select one from five areas: cathode materials for lithium-ion battery, Electrode materials for solid state battery, Electrocatalyst for CO₂ reduction and fuel cells, new materials for Na-ion battery, Structure characterization of materials. Instructors are available online or offline.

	Week1							Week2						
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
M	Reg	L	S	S	S	S	Visit	L	S	S	S	S	S	Leave
A	Open	S	C	C	C	A1		S	C	C	C	A2	Close	
E		S	G		G			S	G		G			

Note: M: Morning; A: Afternoon; E: Evening; L: Lecture; S: Seminar; C: Competition; G: Group Study; A1 &A2: Activities;

CONTACT INFORMATION

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INTERNATIONAL SUMMER SCHOOL

SOURCE OF CREATIVITY: MATHEMATICS

Jul 1st – Jul 14th, 2023

Harbin Institute of Technology, Harbin, P.R. China

GENERAL INFORMATION

Mathematics, especially theoretical mathematics, is an important foundation for scientific research. Both artificial intelligence and quantum communication need strong support from fundamental disciplines such as mathematics and physics. The reason for lack of major original scientific research results is that the ‘neck’ is stuck in the fundamental disciplines. In order to build up students’ foundation in theory, to understand the cross-application of mathematics and other fields, and to cultivate more innovative talents, the School of Mathematics relies on the Sino-Russian Joint Research Centre for Applied Mathematics and the Sino-Russian Joint Campus in terms of both fundamental mathematics and cross-application, and invites experts in relevant fields from the Russian Academy of Sciences, St. Petersburg State University and St. Petersburg State Technical University to conduct course teaching, academic lectures and innovative practical activities. The international summer school will include subjects such as mechanics and mathematics, game theory and mathematical statistics. This international summer school is characterized by “equal emphasis on foundation and cross application”, which will broaden students’ academic vision and knowledge application ability, and cultivate excellent reserve talents for mathematics and cross application disciplines.

PROJECT ARRANGEMENT

● COURSES AND LECTURES

Speaker	Professional Title	Institution	Topic
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Mazalov Vladimir	Professor	Russian Academy of Sciences	Social network analysis
ELENA PARILINA	Professor	St. Petersburg State University, Russia	Mathematical statistics
ANNA TUR	Associate professor	St. Petersburg State University, Russia	Queuing theory
Gubar Elena	Associate professor	St. Petersburg State University, Russia	Evolutionary game theory
Igor Ignatovich	Researcher	St. Petersburg State University, Russia	Mathematical methods of classical mechanics
Ivan Blekanov	Associate professor	St. Petersburg State University, Russia	Web3.0
Krylatov Alexander	Associate professor	St. Petersburg State University, Russia	Optimization method

● RESEARCH PROJECT

In this summer school, students will work in groups on the following topics.

(1) Social network analysis

The objective of this project is to gain a deep understanding of social network analysis methods through data set analysis of facebook.

(2) Mathematical statistics practical project

The linear regression method was used to predict the house prices in Harbin: the dependent variable (house prices) could be predicted by fitting the independent variables. The project is based on the study of specific problems and the calculation of linear regression.

(3) Practice of queuing theory

Consider a customer queuing model, analyze the queuing elements, formulate queuing rules and service rules, and use MATLAB to generate and implement a queuing system with GUI interface.

(4) Virus transmission model

Consider constructing a virus SEIR model and conducting simulation prediction based on the COVID-19 data in spring 2020.

(5) Practical research on mathematical methods of classical mechanics

The movement of the double pendulum is simulated numerically. The project requires students to use MATLAB or other mathematical software to solve its equations of motion and observe simple harmonic vibration and chaotic processes.

(6) Web3.0 research

Discuss the technical prospects of WEB3.0 freely by comparing WEB3.0 and WEB1.0 with WEB2.0.

(7) Optimization method practice

For a given class of items, students are grouped into unconstrained optimization methods to solve, and compare the differences between different algorithms.

PROGRAM DATES AND TIMES

Summer School: 1 July 2023 to 14 July 2023

CONTACT INFORMATION

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INTERNATIONAL SUMMER SCHOOL

PHYSICS AND FUTURE TECHNOLOGY CHANGES

Jul 2 – Jul 14, 2023

Harbin Institute of Technology, Harbin, P.R. China

GENERAL INFORMATION

The International Summer School of “Physics and Future Technology Changes” at Harbin Institute of Technology aims to provide undergraduate students majoring in physics and related fields at home and abroad with a platform to understand the latest development and applications of physics, to provide opportunities for students at home and abroad to exchange and learn, to create an atmosphere for professional English learning and improvement, and to promote students majoring in related fields to further understand the field and stimulate more youths’ research interests.

ATTENDANCE REQUIREMENTS

Undergraduate or graduate attendees with background in general physics are welcomed. All participants must have a good command of English.

LECTURES AND TALKS

The summer school offers 4 lectures and 12 seminars. Lecturers and speakers are invited from top institutions in Russia, Singapore and China.

Lecturer/Speaker	Institution	Topic	Units (50mins/unit)
Prof. Vladimir Yu. Venediktov	Saint Petersburg National University of Electronic Technology	L1: Introduction to modern optics	10 (lecture)
Prof. A. S. Chirtsov	Saint Petersburg National University of Electronic Technology	L2: Demonstrations on the course of general physics and theoretical interpretation of the observed phenomena in Classical physics	10 (lecture)
Prof. O. S. Alekseeva	Saint Petersburg National University of Electronic Technology	L3: Introduction to relativistic and quantum physics	10 (lecture)

Prof. Shibo Xi	National University of Singapore	L4: Generation and application of synchrotron radiation	10 (lecture)
Prof. Chong Kim ONG	National University of Singapore	T1: High temperature superconducting technology	2 (talk)
Prof. Arkhipov Mikhail V.	ITMO University in Russia	T2: Introduction to optics of unipolar and subcycle light	2 (talk)
Prof. Ismail Rafatov	Middle East University of Science and Technology	T3: Frontiers in numerical simulation of plasma physics	2 (talk)
Prof. Evgeny Bogdanov	Saint Petersburg State University	T4: Plasma physics model	2 (talk)
Prof. Xiaogang Wang	Harbin Institute of Technology	T5: Overview of space plasma	2 (talk)
Prof. Yimu Chen	Harbin Institute of Technology (Shenzhen)	T6: Light field regulation in micro/nano structures	2 (talk)
Prof. Liangcai Cao	Tsinghua University	T7: Intelligent holographic photonics	2 (talk)
Prof. Anatoly kudryavtsev	Harbin Institute of Technology	T8: Progress in low-temperature plasma	2 (talk)
Prof. Kurban Rabadanov	Dagestan State University	T9: Introduction to plasma modeling and simulation	2 (talk)
Prof. Alexander Astafiev	Saint Petersburg National University of Electronic Technology	T10: Low temperature plasma generation technology	2 (talk)
Prof. Vladislav Igumnov	Tomsk Polytechnic University	T11: High energy microwave generation technology	2 (talk)
Prof. Hao Tian	Harbin Institute of Technology	T12: Optoelectronic functional materials and devices	2 (talk)

GROUP RESEARCH PROJECT

According to the International Young Physicists Tournament (IYPT), eight topics that are easy to operate, interesting, and rich in physical content have been selected as research topics. Students sign up voluntarily, with 3-4 people in each group, equipped with a guidance team of professors in the Schools of Physics.

PROGRAM DATES AND TIMES

	Week 1 (7.3-7.8)						Week 2 (7.10-7.14)				
	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri

M	L1	L1	L2	L2	L3	L3	L4	L4	T5	T8	T11
	L1	L1	L2	L2	L3	L3	L4	L4	T6	T9	T12
A	L1	T1	L2	T2	L3	T3	L4	T4	T7	T10	
	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	

(GR is the abbreviation for Group Research)

CONTACT INFORMATION

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INTERNATIONAL SUMMER SCHOOL

COMPUTING FOR FUTURE, INTELLIGENCE FOR SUCCESS

July 3, 2023 - July 20, 2023

Harbin Institute of Technology, Harbin, P.R. China

I. INTRODUCTION TO INTERNATIONAL SUMMER SCHOOL OF FACULTY OF COMPUTING

Artificial intelligence(AI) is increasingly becoming the core technology leading the new round of technological revolution and industrial change, and the application scenarios in manufacturing, finance, education, healthcare and transportation come to reality, greatly changing the established production and life style. The Faculty of Computing of HIT(HIT-FoC) has privilege in the field of AI and intelligent interconnection in China, and has a profound teaching and research foundation in related fields. AI of HIT-FoC embodies the achievements of more than 60 years of professional development of computer professionals, carries decades of research results of computer application technology. In order to meet the requirements of the development of era and rely on the disciplinary advantages, HIT-FoC intends to host the 7th International Summer School “Computing for Future, Intelligence for Success”.

2023 International Summer School welcomes undergraduates of HIT, C9/E9 universities and international partner universities. Based on the experience of previous International Summer School, HIT aims to enrich and refine the outstanding traditions, closely follow the requirements and objectives of cultivating talents in basic disciplines, highlight the distinctive theme of AI, design teaching sessions with progressive knowledge and ability enhancement, led by teaching courses AI field, interspersed with cutting-edge lectures to broaden international vision, organize theoretical and practical research, and comprehensively improve students' practical ability.

II. ADMISSION REQUIREMENTS

2023 International Summer School is open to sophomore and junior undergraduates of related majors(computer science and technology, software engineering, Internet of Things, big data, AI, information security, bio informatics, communication engineering, automatic control, electrical engineering, etc.) from overseas partner institutions and well-known universities in China. Since the course is taught in English, it requires strong English listening and speaking skills.

III. TEACHING ARRANGEMENT OF INTERNATIONAL SUMMER SCHOOL

● TEACHING SCHEDULE

Arrangements	Lecturers	Universities	Course	Credit	Credit Hour
Course Arrangement (Select One from Two)	Gaurav Sharma	University of Rochester	Graphical Models and Probabilistic Inference	1	16
	Francesco Amigoni	Polytechnic University of Milan	Multi-Agent and Multi-Robot Systems	1	16

● TECHNICAL LECTURES

Academic frontier lectures by internationally renowned scholars and discipline leaders of our academic department and renowned teachers, and two lectures on modern technology by domestic well-known enterprise professionals are arranged to allow students to broaden their breadth of knowledge and to appreciate frontier technology.

Program Contents	Faculty in Charge	Credit	Credit Hour
Academic Frontier Lectures (Four Sessions)	Domestic and foreign renowned scholars Leaders of FoC	0.5	8

Modern Technology Lectures (Two Sessions)	Corporate Mentors	0.5	8
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● **PROJECT PRACTICE**

Arrangements	Lecturer	Course	Credit	Credit Hour
Project Research (Students can choose either one)	Senior Science and Innovation Instructor	Multiple topics depending on the number of students	1	1 week

CONTACT INFORMATION

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INTERNATIONAL SUMMER SCHOOL

METABOLISM & DISEASES

July 3rd- July 14th, 2023

Harbin Institute of Technology, Harbin, P. R. China

GENERAL INFORMATION

The second Harbin Institute of Technology International Summer School of “Metabolism & Diseases” will be hosted by the School of Life Sciences and Technology, Harbin Institute of Technology. Recent outbreaks of COVID-19 and influenza A have highlighted the significance of life and health. The School of Life Sciences and Technology focuses on public safety and well-being topics, such as glucose and lipid metabolism regulation & diseases, tissue engineering, and nanobiotechnology. We have invited international experts and scholars to establish a series of English courses, lectures, symposiums, and hands-on projects rooted in local culture while expanding global perspectives. To broaden students’ scientific and cultural knowledge, we have established a platform for learning, communication, and hands-on practice, emphasizing the interconnection and integration of knowledge. We have also designed various experiential growth training methods to encourage well-rounded development through peer-to-peer learning and collaboration. To deepen students’ comprehension of the biological underpinnings of life and health, we foster a rigorous academic environment, tap into diverse and open international resources, encourage scholarly exchanges between domestic and international faculty and students, and provide guidance and inspiration for students to become high-level international experts in their respective fields.

ATTENDANCE REQUIREMENTS

- ✓ Undergraduate students

- ✓ Interested in life sciences
- ✓ Proficiency in English (able to fluently write, converse, and report in English)

COURSES AND LECTURES

Content	Detailed information	Credit	Class Hour
Internationalization Courses	Regulation of lipid metabolism and diseases	1.5	24
Academic Frontier Lectures	Tumor cell biology, structural biology, metabolic biology, tissue engineering, etc	1.5	18

RESEARCH PROJECTS

Content	Detailed information	Credit	Class Hour
Offline Practical Activities	1 Immunofluorescence Labeling of Cellular Structure 2 Analysis of Protein Structure by Freezing Electron Microscope and Nuclear Magnetic Resonance 3 Screening and analysis of Differentially Expressed Genes in Tumors Based in Database	1	24
Discussion and Interaction	1 Teacher-student communication and discussion, Q & A session 2 Student Future Planning Guidance Symposium 3 After-class socializing		
Visiting and Studying	1 Visit the School of Life Sciences and the Life Center research laboratories, introducing the latest research achievements and outcomes in life science studies at the school and the center. 2 Visit HIT Museum and HIT Space Museum		

CONTACT INFORMATION

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