

Imperial Data Science Summer School

22nd July to 8th August 2023 at Imperial College London



IMPERIAL COLLEGE LONDON AND THE DATA SCIENCE INSTITUTE

Consistently rated amongst the world's best universities (3rd in Europe and 6th in World, QS World University Rankings 2023), Imperial College London is a science-based institution with an international reputation for excellence in teaching and research. Imperial attracts over 22,000 students and 8,000 staff of the highest international quality from over 126 different countries.

Since its foundation in 1907, Imperial's contributions to society have included the discovery of penicillin, the development of holography and the foundations of fibre optics. This commitment to the application of research for the benefit of all continues today, with current areas of focus including interdisciplinary collaborations to improve global health, tackle climate change, develop sustainable sources of energy, address security challenges, develop data management and analysis technologies for supporting data driven research, and tackling problems at molecular scale.

Imperial's Centre for Continuing Professional Development had extensive experience in developing and running a range of summer schools for undergraduate students. We draw on Imperial's education pedagogy to design and deliver programmes that provide an engaging learning experience for students, incorporating group projects that are designed to assess students' learning outcomes.



The **Data Science Institute (DSI)** is a major Imperial College London initiative that brings together Imperial's existing data science activities and expertise and provides a focus and a catalyst for new partnerships.

The DSI supports multidisciplinary collaborations between the College's academic experts in many disciplines such as healthcare, financial services, climate science, and city infrastructure to create solutions to complex problems. Alongside research, the Institute fosters the next generation of data scientists and engineers by developing a range of postgraduate and executive courses.

The DSI includes 7 Academic Labs, has attracted over £50m in funding for data science research, technology and infrastructure and has published over 300 papers.

The Institute's Data Observatory (DO) was one of the first and largest visualisation suites in Europe. It provides a multi-dimensional and immersive environment to analyse large and complex data sets and to work collaboratively.

Thanks to its many research collaborations both across College and with a variety of external academic and industrial partners, the DSI is establishing its role as an international hub in data science.

SUMMER SCHOOL OVERVIEW

Data Science is successfully adding value to all business models using statistics and deep learning tools to make better decisions. A growing number of companies are now hiring data scientists to crunch data and predict possible situations and risk for businesses.

This summer school is designed for undergraduate students, in the final two years of their undergraduate studies, studying IT, computing or any engineering degrees at a well-recognised university in China, with an interest in data science. Students will be introduced to the concept, develop an understanding of data science, hear from experts on data science applications and work in teams towards a technical project.

Team-based learning through group project:

Students will be working in small teams on a group project as outlined below:

Gliomas are the most common malignant brain tumours causing significant mortality and morbidity around the world. Accurate detection of brain tumours has always been a real-world challenge with

great clinical importance. Imaging tests like MRI scans are commonly used for checking an abnormal brain area that is likely to be gliomas. Examining an MRI scan is a time-consuming and tedious task for clinicians. In this technical project, students will develop an accurate and automated AI framework that is able to detect and segment brain tumours in MRI scans. This framework not only has the potential for improving efficiency in healthcare systems, but also for extracting imaging biomarkers for assessing the disease progression and evaluating the outcome of the treatments.

Supervised by Imperial academics throughout the programme, students will present the project to a panel of experts on the last day of the programme.

Learning objectives:

On completion of this summer school, students will be able to:

- Understand the basic concepts of Data Science;
- Develop an understanding of exploratory data analysis, natural language processing, data science for computer vision and machine learning for data science;
- Establish an understanding of data visualisation and see how this is presented in the state-of-the-art 360 observatory;
- Understand the real-world applications in data science and how data science can transform the future of healthcare;
- Establish an understanding of data entrepreneurship and blockchain technology;
- Understand the importance of data privacy and ethics;
- Gain a unique insight into advances in data science through Imperial's researchers in data science;
- Develop valuable professional skills in teamwork, communication and presentation;
- Experience team-based learning through a technical data science project;
- Practice and improve their English language.

In addition, students will have an opportunity to make new friends, get to know student ambassadors from Imperial College London through social activities and discuss opportunities for future study and experience what it is like to study in a world class university.

Visit to the Data Science Institute



As part of this summer school, students will have a unique opportunity to visit the state-of-the-art 360 Observatory at the Data Science Institute, one of the seven Global Institute at Imperial College London, and see demonstrations of cutting edge data science research.

PROGRAMME STRUCTURE AND FORMAT

64.5 contact hours spread over 3 weeks covering lectures, workshops, tutorials, project work and visits. Classes will be delivered on weekdays.

Students will be allocated in small groups for Project work which will be done through team- based learning with supervision. Final project will be presented in groups to a panel of experts on the last day of the programme. A prize will be awarded to the team with the best project. The entire programme will be taught in English.

CERTIFICATION

Students will receive a verified Imperial College London certificate on successful completion of the summer school and a prize will be awarded to the best project team. Each student will also receive a transcript for their project marks.

ENTRY REQUIREMENTS

All students are expected to be studying an undergraduate or postgraduate degree, in any engineering discipline, IT or computing degree at a well-recognised university.

English requirements:

All students are required to have a good command of English, and if it is not their first language, they will need to satisfy the College requirement as follows:

- a minimum score of IELTS (Academic Test) 6.5 overall (with no less than 6.0 in any element) or equivalent.
- TOEFL (iBT) 92 overall (minimum 20 in all elements)
- CET- 4 (China) minimum score of 550
- CET- 6 (China) minimum score of 520

*The English qualification certificate is waived for both programme and scholarship application for the student undertake higher education (undergraduate or postgraduate) studies in English.

*If you have difficulty providing the evidence, you will be required to attend an online interview.

Technical requirements:

As the project has a strong technical element, students are expected to have the following technical knowledge and interest:

- Interested in computer visualisation / natural language processing;
- Have at least intermediate level at one of the common programming language (Python, Java, C ++, etc.);
- Have mathematical foundation (probability theory, linear algebra, etc.);
- Have understanding of the Linux environment;
- Knowledge of Machine Learning with experience in using PyTorch / Tensorflow / Keras.

Students will be asked to bring along their computer pre-installed with Python for project work.

COST

The cost of the Summer School is **£5280**.

The fee includes all tuition which covers:

- Lectures, project work, supporting materials, project mark and Imperial College certificate of attendance,
- Campus tour, visits and social activities in the programme schedule,
- Lunches and refreshments on weekdays from 24th July to 5th August,
- Accommodation fee for 17 nights.
- Overseas insurance expenses;
- A London Transport card with a top-up value of £5;
- Shuttle service (bus).

***Scholarship Application**

Please note you are also eligible to apply for the scholarship and get a tuition fee deduction. A scholarship of **up to £600** will be provided by *Global University Online*.

To apply, please complete an [online application form](#) and upload your personal statement (within 500 words) and CV/resume. For more details, please visit:

<http://www.globaluniversityonline.org/hqdx.php/scholarship/detail/25.html?lang=en>

The deadline for scholarship application is 23:59 30th April (UK time).

APPLICATION

Step 1: Please complete the application form: <http://imperial.mikecrm.com/shMVcYi>

Step 2: Please note that you will need to send a copy of your university transcript and evidence of English language proficiency to the email: icdsi.programme@gmail.com. It is important that the transcript includes your full name. If this document is not in English, please provide a brief translation.

*The English qualification certificate is waived for the student undertake higher education (undergraduate or postgraduate) studies in English.

If you have difficulty providing the above evidence, you will be required to attend an online interview.

The Summer School application deadline is 23:59 31st May (UK time).

We receive applications on a daily basis, therefore in order to avoid disappointment we suggest that students apply as early as possible.

PROVISIONAL SCHEDULE (subject to change)

22nd July, Saturday	
	Arrive in the UK Ice-breaking Session (depending on the arrival time of students)
23rd July, Sunday	
10:30	Orientation
14:00	Academic English Skills
16:30	End of day
24th July, Monday	
09:00	Programme Registration
09:15	Welcome, Housekeeping and Introduction to Imperial
09:30	Programme Overview and Icebreaker
10:00	Introduction to Data Science
12:30	Group Photo
13:00	Welcome lunch with student ambassadors Followed by campus tour
14:00	Team building and leadership
16:30	End of day
25th July, Tuesday	
09:30	Exploratory Data Analysis
11:00	Introduction to Natural Language Processing
12:30	Lunch
13:30	Group Project Introduction and Briefing Data preparation
16:30	End of day
26th July, Wednesday	
09:30	Data Science for Computer Vision
12:30	Lunch
13:30	Social activity 1 Thames River Cruise
16:30	Tour ends
27th July, Thursday	
09:30	Machine Learning for Data Science
12:30	Lunch
13:30	Project tutorials Q & A
15:00	Teams work on group project
16:30	End of day
28th July, Friday	
09:30	Data Visualization
12:30	Lunch
13:30	Visit to DSI 360 observatory for Groups 1, 2, 3, 4
14:30	Visit to DSI 360 observatory for Groups 5, 6, 7, 8
15:30	Visit to DSI 360 observatory for Groups 9, 10, 11
16:30	Visit to DSI 360 observatory for Groups 12, 13, 14
	Teams work on group project during non-visit period
17:30	End of day
29th & 30th July, Saturday & Sunday	
Free time to explore London	

31st July, Monday

09:30	Data Science Entrepreneurship
12:30	Lunch
13:30	Effective Communication for Presentation Workshop
16:30	End of day

1st August, Tuesday

09:30	Transforming the future of healthcare with data science
12:30	Lunch
13:30	Social activity 2
	Silicon Roundabout Tech City Tour
16:30	Tour ends

2nd August, Wednesday

09:30	Introduction to Blockchain Technology
12:30	Lunch
13:30	Data Privacy and Ethics
15:30	Teams work on group project
16:30	End of day

3rd August, Thursday

09:30	Advances in Data Science - Research showcase
12:30	Lunch
13:30	Opportunities for International Students
14:00	Project tutorials Q & A
15:30	Teams work on group project
16:30	End of day

4th August, Friday

09:00	Students arrive to upload project presentations
09:30	Group 1
09:45	Group 2
10:00	Group 3
10:15	Group 4
10:30	Group 5
10:45	Break
11:00	Group 6
11:15	Group 7
11:30	Group 8
11:45	Group 9
12:00	Group 10
12:15	End of presentation
	Students to complete feedback form
12:45	End of summer school reception lunch
14:00	Announcement of winning teams
	and Certificate Ceremony
15:00	End of summer school

5th & 6th August, Saturday & Sunday

Free time to explore London

7th August, Monday

10:30	Workshop: Alumni Experience Sharing (Master's and PhD/ Career opportunities)
13:30	London Visit

8th August, Tuesday

London Visit / Departure Day

TEACHING FACULTY

The summer school is founded by Professor Yike Guo and co-directed by [Dr Kai Sun](#) and Huang Ping and taught by a multi-disciplinary teaching faculty from the Data Science Institute and other departments of Imperial College London.

LOCATION

The summer school will take place at Imperial College London's South Kensington Campus, located amongst many famous [attractions](#) in London.

The culture triangle: neighbour to three of London's most prestigious (and free) museums. Right next door, the Science Museum. Across the road, the Victoria & Albert Museum, and around the corner of the Natural History Museum. From Neolithic to the latest scientific breakthroughs, experience it all just minutes from Imperial's doorstep.

The campus is also next to the famous Royal Albert Hall, one of London's most iconic music venues, established in 1871, host to the BBC Proms and countless world-famous international artists.

In addition, the beautiful Hyde Park and the famous Harrods Department Store are just a short walk from the campus.



FEEDBACK FROM 2022 COHORT

"I really have learned a lot through the programme. Thanks to all professors and supervisors"

- student from Shanghai Jiaotong University

"High quality teaching, useful knowledge and full support"

- student from Shanghai Jiaotong University

"Wonderful. It enhanced my understanding of data science. It was also wonderful to listen and discuss opinions with the professors"

- student from Zhejiang University

"It's indeed a wonderful experience, learning knowledge and coming across with so many excellent teachers and classmates"

- student from Zhejiang University

"This programme opens a door to the world of data science for me! Brilliant!"

- student from Zhejiang University

"The project gave me the opportunity to meet many great students and professors. I learned how to use artificial intelligence to improve everyday tasks, including but not limited to the computer vision and natural language projects in the program. This has greatly broadened my horizons and expanded my knowledge beyond my undergraduate studies. "

- student from Xi'an Jiaotong-Liverpool University

"Many thanks for this valuable experience. I have benefited greatly from being exposed to cutting-edge data science knowledge and trying to work on a project with students from different schools and disciplines. I will always cherish this memory. "

- student from Nanjing Audit University

"It's a fantastic opportunity to experience the research atmosphere at Imperial College London. It is exhilarating to meet so many outstanding staff and professors talking like friends to us. It was also a valuable experience working with my teammates, who doesn't actually know each other before, but come together tighter after this programme. And my passion towards IC has never become so high like now. "

- student from University of Nottingham Ningbo China