Imperial Data Science Online Winter School
Engage with Imperial academics "live" online!
Experience team-based learning through a technical project!

IMPERIAL COLLEGE LONDON AND THE DATA SCIENCE INSTITUTE

Consistently rated amongst the world's best universities (4th in Europe and 9th in World, QS World University Rankings 2020), Imperial College London is a science-based institution with an international reputation for excellence in teaching and research. Imperial attracts over 17,000 students and 8,000 staff of the highest international quality from over 136 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 online winter schools for students. We draw on Imperial's education pedagogy in online learning to design and deliver winter schools that provide an engaging learning experience for students. Various interactive applications are used to support live teaching, online group projects are designed to assess students' learning outcomes and virtual social platform created in Flipgrid will provide students with a networking environment.

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.

WINTER 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 online winter school is designed for students 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 industry experts on data science applications and work in teams towards a technical project.

Students will:

● Learn the concept of Data Science;
● Develop an understanding of data analysis, AI, machine learning for data science, exploratory data analysis and visualization;
● Understand the real-world applications in data science and hear from industry expert;
● Get an insight into advances in data science;
● Gain an understanding of data privacy and ethics;
● Learn from research experts in data economy and block chain;
● Develop valuable professional skills in team building, communication and presentation;
● Experience team-based learning through a technical data science project;
● Practice and improve their English language.
● Gain an understanding of the British Culture and visit to London Landmarks through virtual social activities.

Students will be working in project teams to prepare data and create a technical demonstration, engaging with Imperial supervisors throughout the programme. Previous projects include developing a model for brain tumour detection. The student will learn to prepare, transform and clean the dataset, as well as visualise big data and their findings on the dataset.

In addition, students will have an opportunity to take part in virtual social activities, meet and discuss with Imperial ambassadors online, sharing their experiences on what it is like to study in a world class university and to discuss opportunities for future study.

PROGRAMME STRUCTURE AND FORMAT

43 learning hours spread over 3-4 weeks covering live lectures, workshops, tutorials, project work and self-study time.

Live classes of between 1.5 to 2 hours duration will be delivered on weekdays over a three-week period. Some days will have an additional one-hour live tutorial session with a project supervisor. All classes will be delivered between 08:30 and 10:30 UK time / 15:30 to 17:30 China time.

Project work will be done through team-based learning with supervision. Final projects 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.

Online project channels will be allocated to each team for project work and tutorials. Students will be able to use the channel at any time to work on their project.

The entire programme will be taught in English.

CERTIFICATION

Students will receive a verified Imperial College London digital certificate on successful completion of the winter 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 degree in any engineering discipline, IT or computing degree at a well-recognised university in China.

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

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 need to have access to a computer pre-installed with Python, have a webcam, microphone and good internet connection to attend the live classes.

COST

The cost of the programme is £1850.

TEACHING FACULTY

The winter school is co-directed by Professor Yike Guo and taught by a multi-disciplinary teaching faculty from the Data Science Institute and other departments of Imperial College London.

Professor Yike Guo
Co-Director of the Data Science Institute
Professor of Computing Science
Imperial College London

Yike Guo is Professor of Computing Science in the Department of Computing at Imperial College London. He is the founding Director of the Data Science Institute at Imperial College. He is a Fellow of the Royal Academy of Engineering (FREng), Member of Academia Europaea (MAE), Fellow of British Computer Society and a Trustee of The Royal Institution of Great Britain.

Professor Guo received a first-class honours degree in Computing Science from Tsinghua University, China, in 1985 and received his PhD in Computational Logic from Imperial College in 1993 under the supervision of Professor John Darlington. He founded InforSense, a software company specialized in big data analysis for life science and medicine, and served as CEO for several years before the company's merger with IDBS, a global advanced R&D software provider, in 2009. He was then the Chief Innovation Officer of the IDBS until 2018. He also served as the Chief Technical Officer of the tranSMART foundation, a global alliance in building open source big data platform for translational medicine research.

He has been working on technology and platforms for scientific data analysis since the mid-1990s, where his research focuses on data mining, machine learning and large-scale data management. He has contributed to numerous major research projects including: the UK EPSRC platform project, Discovery Net; the Wellcome Trust-funded Biological Atlas of Insulin Resistance (BAIR); and the European Commission U-BIOPRED project. He was the Principal Investigator of the European Innovative Medicines Initiative (IMI) eTRIKS project, a €23M project building a cloud-based informatics platform, in which tranSMART is a core component for clinico-genomic medical research, and co-Investigator of Digital City Exchange, a £5.9M research programme exploring ways to digitally link utilities and services within smart cities.

Professor Guo has published over 250 articles, papers and reports. Projects he has contributed to have been internationally recognised, including winning the "Most Innovative Data Intensive Application Award" at the Supercomputing 2002 conference for Discovery Net, the Bio-IT World "Best Practices Award" for U-BIOPRED in 2014 and the "Best Open Source Software Award" from ACM SIGMM in 2017.

Photos above: Data Science Institute 360 degree observatory and Professor Yike Guo hosting a visit of President Xi Jingping in October 2015.

FEEDBACK FROM PAST STUDENTS

- *"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

Photo above: 2020 Data Science Online Summer School cohort

Imperial Data Science Online Winter School, 24 Jan to 15 Feb 2022

*Pre-sessionals: start from 22 January 2022

Pre-sessionals:

Saturday 22 Jan 2022

UK time	Beijing time	
08:00	16:00	**Orientation**
08:30	16:30	**Academic English Skills**
10:30	18:30	**End of session**

Sunday 23 Jan 2022

UK time	Beijing time	
08:30	16:30	**Cross-cultural Communication**
10:30	18:30	**Workshop**
11:30	19:30	**End of session**

Week 1:

Monday 24 Jan 2022

UK time	Beijing time	
08:00	16:00	**Welcome and Introduction to Imperial College London**
08:20	16:20	**Programme overview & ice-breaker**
09:00	17:00	**Introduction to Data Science**
10:30	18:30	End of session

Tuesday 25 Jan 2022

UK time	Beijing time	
08:30	16:30	**The world of Artificial Intelligence (first hand experience)**
10:00	18:00	**The world of Artificial Intelligence (first hand experience II)**
11:30	19:30	End of session

Wednesday 26 Jan 2022

UK time	Beijing time	
08:30	16:30	**Group Project Briefing and Planning**
		Data preparation
10:00	18:00	**Social activity 1**
11:00	19:00	End of session

Thursday 27 Jan 2022

UK time	Beijing time	
08:00	16:00	**Team Building and Leadership**
10:00	18:00	**Project tutorials Q & A**
11:00	19:00	End of session

Friday 28 Jan 2022

UK time	Beijing time	
08:30	16:30	**Data Visualization**
10:00	18:00	*Self-study : students work on project in channels*
11:00	19:00	End of session

Saturday 29 Jan 2022 & Sunday 30 Jan 2022

no class for weekend

Week 2:

Monday 31 Jan 2022

no class (Spring Festival)

Tuesday 1 Feb 2022

no class (Spring Festival)

Wednesday 2 Feb 2022

UK time	Beijing time	
08:30	16:30	**To be confirmed**
10:00	18:00	*Self-study : students work on project in channels*
11:00	19:00	End of session

Thursday 3 Feb 2022

UK time	Beijing time	
08:30	16:30	**Machine Learning for Data Science**
10:00	18:00	**Project tutorials Q & A**
11:00	19:00	End of session

Friday 4 Feb 2022

UK time	Beijing time	
08:30	16:30	**Exploratory Data Analysis**
10:00	18:00	**Social activity 2**
11:00	19:00	End of session

Saturday 5 Feb 2022 & Sunday 6 Feb 2022

no class for weekend

Week 3:

Monday 7 Feb 2022

UK time	Beijing time	
08:30	16:30	**Data Science and Application - Industry perspective**
10:00	18:00	**Project tutorials Q & A**
11:00	19:00	End of session

Tuesday 8 Feb 2022

UK time	Beijing time	
08:30	16:30	**Effective Communication for Presentation**
10:30	18:30	*Self-study : students work on project in channels*
11:30	19:30	End of session

Wednesday 9 Feb 2022

UK time	Beijing time	
08:30	16:30	**Data Privacy & Ethics**
10:00	18:00	**Project tutorials Q & A**
11:00	19:00	End of session

Thursday 10 Feb 2022

UK time	Beijing time	
08:30	16:30	**Data Economy and Block Chain**
10:30	18:30	*Self-study : students work on project in channels*
11:30	19:30	End of session

Friday 11 Feb 2022

UK time	Beijing time	
08:30	16:30	**Advances in Data Science & Discussion with the students**
10:00	18:00	**Social activity 3**
11:00	19:00	End of session

Saturday 12 Feb 2022 & Sunday 13 Feb 2022

no class for weekend

Week 4:

Monday 14 Feb 2022

UK time	Beijing time	
08:30	16:30	**Opportunities for International Students**
09:30	17:30	**Q & A with Imperial student ambassadors**
10:30	18:30	**Project tutorials Q & A**
11:30	19:30	End of session

Tuesday 15 Feb 2022

UK time	Beijing time	
Project presentation		
08:00	16:00	**Group 1**
08:15	16:15	**Group 2**
08:30	16:30	**Group 3**
08:45	16:45	**Group 4**
09:00	17:00	**Group 5**
09:15	17:15	**Group 6**
09:30	17:30	**Group 7**
09:45	17:45	**Group 8**
10:00	18:00	**Group 9**
10:15	18:15	**Group 10**
10:30	18:30	**Group 11**
10:45	18:45	**Group 12**
11:00	19:00	End of presentation
11:00	18:00	**Students to complete online evaluation**
11:15	18:15	**Announcement of winning team**
11:30	18:30	**End of programme**

Note: The above is the reference itinerary, which might be adjusted according to the actual situation.