Imperial College London

# Introduction to Artificial Intelligence and Data Science for Business Innovation

***Dive into the world of AI and Data Science and upskill yourself for the future! Join this online winter programme by Imperial's Data Science Institute***

**1st to 14th February 2023, Online via MS Teams & Zoom**

## IMPERIAL COLLEGE LONDON AND THE DATA SCIENCE INSTITUTE

Consistently rated amongst the world's best universities (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 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 has extensive experience in developing and running a range of online winter schools for undergraduate 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 and online group projects 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 which 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.

In the past 6 years since its creation, 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.

## WHY ATTEND THIS WINTER SCHOOL

Artificial intelligence and data science have a pivotal role in driving a new era of innovation in many fields and they have the potential to transform businesses and industries.

As the knowledge of data science and AI is successfully adding value to business innovations, a growing number of organisations are now looking for these skills set in their recruitment.

This online winter school is designed for undergraduate students with NO coding knowledge, studying any subject disciplines, with an interest in learning the applications of AI and data science in businesses.

Students will be introduced to the concept of data science and AI, hear from industry experts on these applications and learn basic Python coding to work in teams towards a group project.

**Team-based Learning**:

Students will be working in small teams to work on a group project as outlined below:
Covid-19 been characterised as a pandemic by the World Health Organization (WHO) in 2020, and it is still causing many problems in some countries. Early detection of Covid-19 is crucial to identify those infected people and to limit the spread of the virus. One of the symptoms of Covid-19 is the infections in patients' respiratory system, so CT scans that show lung conditions are considered to be a reliable method for detecting and diagnosing Covid-19. In this project, we aim to develop an AI-assisted framework that enables a fast and reliable detection of Covid-19 in CT images. Such framework has the potential to ease the human resources crisis in healthcare systems caused by Covid-19.

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

**Leaning objectives:**

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

- Develop an understanding of data science and AI's application in various industries sectors and how they support business innovations.
- Develop an understanding of data entrepreneurship.

- Explain how machine learning is used for data analysis.
- Understand how robotics and AI play an important role in engineering design.
- Understand how data are presented using visualisation tools.
- Understand how AI is used to assist electronic health records.
- Explain blockchain technology and it's applications.
- Explain the importance of data privacy and ethics.
- Apply basic coding in Python.
- Identify valuable professional skills in team building, communication and presentation and apply on a team-based project.
- Improve their English language.

In addition, students will participate in online social activities, meet new friends and hear about opportunities for international students at Imperial.

## PROGRAMME STRUCTURE AND FORMAT

40 learning hours spread over 10 weekdays covering live lectures, tutorials, project work and self-study time.

Live sessions of up to 4 hours' duration will be delivered on weekdays. Classes are delivered from 08:00 UK time / 16:00 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.

The programme will be delivered over Microsoft Teams and Zoom. Online project channels in MS Teams 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 at a well-recognised university in China meeting the following entry requirements.

*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 requirements 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

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. Guidance will be provided to students on installing python.

Students are NOT expected to have any technical coding skills. This winter school is suited for students studying any subject discipline, looking to diversify their skill set.

## COST

The cost of winter school is £1950.

***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/21.html?lang=en

The deadline of scholarship application is 23:59 30th November (UK time)

## TEACHING FACULTY

The winter school is co-directed by Professor Yike Guo and Dr Chengliang Dai and taught by a multi-disciplinary teaching faculty from the Data Science Institute and other departments at 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.*

**Comments from 2022 participants:**

- This program is fit for beginners in data science to achieve his/her first success in programming.
- The programme gives me the chance to know the current and future of healthcare industry, especially the application of AI in it.
- Wonderful programme. Rich in content and benefits us greatly.
- That is a valuable experience. I've improved my teamwork and English skills during the course. Also, I gained more knowledge about data science and AI.
- Professors are enthusiastic and lessons are of high quality.
- Without any technical background knowledge, the general introductions to AI and data science have helped me to know what they are and their importance.
- Gained technical skills learned through our team project.
- Having so many professors sharing their insights on different subjects are very useful.

## Provisional programme:

# Introduction to Artificial Intelligence and Data Science for Business Innovation

**An online winter programme by Imperial's Data Science Institute, 1st to 14th February 2023**

## Week 1:

| Day 1 | | Wednesday, 1st Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 08:00 | 16:00 | **Welcome and Introduction to Imperial College London** | Betty Yue |
| 08:15 | 16:15 | **Introduction to Imperial's Data Science Institute** | |
| | | **Programme overview & Group Photo** | Ping Huang |
| 08:45 | 16:45 | **What is Data Science?** | Prof. Guo |
| 10:15 | 18:15 | Break | |
| 10:30 | 18:30 | **Social activity 1** | Richard Carruthers |
| 11:30 | 19:30 | End of day | |

| Day 2 | | Thursday, 2nd Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 08:00 | 16:00 | **Introduction to Artificial Intelligence** | Prof. Guo |
| 09:30 | 17:30 | Break | |
| 09:45 | 17:45 | **Python foundations for group project** | Dr Chengliang Dai |
| 10:45 | 18:45 | **Group project briefing and planning** | Dr Chengliang Dai |
| 12:15 | 20:15 | End of day | |

| Day 3 | | Friday, 3rd Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 08:00 | 16:00 | **Data Science Entrepreneurship** | Dr Mark Kennedy |
| 09:30 | 17:30 | Break | |
| 09:45 | 17:45 | **Machine Learning for Data Analysis** | Dr Yves-Alexandre |
| 11:15 | 19:15 | **Self-study** | |
| 12:15 | 20:15 | End of day | |

**Saturday 4th & Sunday 5th Feb 2023 (no classes on weekends)**

## Week 2:

| Day 4 | | Monday, 6th Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 08:00 | 16:00 | **Robotics and AI in Engineering Design** | Prof. Peter Childs |
| 09:00 | 17:00 | Break | |
| 09:15 | 17:15 | **Effective Communication for Presentation** | Dr Helal Ahmed |
| 11:15 | 19:15 | **Project Q&A** | DSI supervisors |
| 12:15 | 20:15 | End of day | |

| Day 5 | | Tuesday, 7th Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 08:00 | 16:00 | **AI-assisted electronic health records (natural language processing)** | Dr Jingqing Zhang |
| 09:30 | 17:30 | Break | |
| 09:45 | 17:45 | **Application of Data Science in Finance** | J H Sun, Royal Bank of Canada |
| 11:15 | 19:15 | End of day | |

| Day 6 | | Wednesday, 8th Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 07:45 | 15:45 | **Introduction to Blockchain Technology** | Dr Kai Sun |
| 09:15 | 17:15 | Break | |
| 09:30 | 17:30 | **Blockchain Applications** | Dr Kai Sun |
| 11:00 | 19:00 | **Self-study** | |
| 12:00 | 20:00 | End of day | |

| Day 7 | | Thursday, 9th Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 08:00 | 16:00 | **Present your data using visualisation tools** | Dr Ovidiu Serban |
| 09:30 | 17:30 | Break | |
| 09:45 | 17:45 | **Project Q&A** | DSI supervisors |
| 10:45 | 18:45 | **Social Activity 2** | TBC |
| 11:45 | 19:45 | End of day | |

| Day 8 | | Friday, 10th Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 08:00 | 16:00 | **Data Science and AI in pharmaceutical industry** | Dr Chengliang Dai |
| 09:30 | 17:30 | Break | |
| 09:45 | 17:45 | **Opportunities for International Students** | Jake Ganymede |
| 10:45 | 18:45 | **Project Q&A** | DSI supervisors |
| 12:15 | 20:15 | End of day | |

**Saturday 11th & Sunday 12th Feb 2023 (no classes on weekends)**

## Week 3:

| Day 9 | | Monday, 13th Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| 08:00 | 16:00 | **The Importance of Data Privacy & Ethics** | Dr Yves-Alexandre |
| 09:30 | 17:30 | Break | |
| 09:45 | 17:45 | **Advances in AI Applications** | Prof. Guo |
| 11:15 | 19:15 | Project rehearsal: Preparation for project presentation | DSI supervisors |
| 12:15 | 20:15 | End of day | |

| Day 10 | | Tuesday, 14th Feb 2023 | |
|---|---|---|---|
| **UK time** | **China time** | | **Speaker** |
| | | **Project presentation** | |
| 08:00 | 16:00 | **Presentation briefing** | Ping Huang |
| 08:15 | 16:15 | **Group 1** | DSI Judging panel |
| 08:30 | 16:30 | **Group 2** | Dr Chengliang Dai |
| 08:45 | 16:45 | **Group 3** | Dr Siyao Wang |
| 09:00 | 17:00 | **Group 4** | |
| 09:15 | 17:15 | **Group 5** | |
| 09:30 | 17:30 | **Break** | |
| 09:45 | 17:45 | **Group 6** | |
| 10:00 | 18:00 | **Group 7** | |
| 10:15 | 18:15 | **Group 8** | |
| 10:30 | 18:30 | **Group 9** | |
| 10:45 | 18:45 | **Group 10** | |
| 11:00 | 19:00 | **End of presentation & break** | |
| | | **Students to complete online evaluation** | |
| 11:30 | 19:30 | **Judging panel reconvene to provide feedback and announcement of winning team** | |
| | | **Presentations feedback and announcement of winning team** | |
| 12:00 | 20:00 | **End of programme** | |