

The Bartlett Centre for Advanced Spatial Analysis



UCL

MSc Smart Cities & Urban Analytics



www.msccsmartcities.org

At CASA our Master's programme draws on the largest group of researchers in urban studies, transport, computer science and planning in the world.

London is our living laboratory - and as one of the world's truly global metropolises, there is nowhere better for learning about the challenges confronting modern cities.


The skills acquired on our course will open doors to a range of new job opportunities in fields such as planning, city governance, engineering and data science that will be crucial to the effective running of our future cities.

Want to
be at the
forefront of
changing
cities for the
better?

Want to
bring this science to
those living in cities
so that they can
be involved in their
future design?

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This new programme is unique in its focus on the core challenges facing our increasingly 'smart' cities, from their operational functions and planning through to management and control. The programme reflects the changes that technology is making to the operation of, and our understanding of, the city, and gives students the technical and theoretical skills needed to make a difference in the cities of today and tomorrow.

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About Smart Cities

By the end of this century, most of us will be living in cities. The cities we live in are becoming increasingly self-aware, with sensors generating data about almost every aspect of the way humans interact with the built environments they inhabit.


Our MSc programme is unique in that it teaches graduates to take advantage of the technological innovations emerging in cities across the globe to tackle some of the fundamental problems facing the urbanised world.

The modules within our programme draw on both well established scientific methods and the latest in urban analytic techniques to explore new, massive datasets, and simulate the function of cities in order that through greater understanding, we can improve these environments for all citizens.

In a 'Smart City', the stakeholders including the citizens themselves, governments and businesses, will make use of new digital technologies such as sensors, data, software and computer hardware, to address the fundamental problems which have beset cities since they were first constructed thousands of years ago.

Problems of social equity, resource efficiency and effective planning and governance are shared by all cities. Smart City technologies offer us the exciting prospect of tackling these well established problems more effectively than ever before.





The CASA MSc in Smart Cities will combine the latest science of cities with the most up to date technologies and data to ensure our graduates leave with an unrivaled set of skills enabling them to be at the forefront of addressing future city challenges.

The technical aspects of the programme will be delivered through traditional workshops, lectures and practicals, but we will seek to incorporate novel assessment methods such as blog posts, and shared outputs such as visualisations/ maps and web apps.

Assessment is through a variety of written coursework and final dissertation, presentation of researched material and practical investigations, and participation in dedicated skills modules.

MSc students undertake modules to the value of 180 credits. The programme consists of six core modules (105 credits), one optional module (15 credits) and a dissertation/report (60 credits).

A Postgraduate Diploma is also available consisting of six core modules (105 credits), one optional module (15 credits).

Key Facts





Our current mix of architects, planners, geographers, mathematicians, physicists, engineers and computer scientists make CASA a unique department within UCL.

Our MSc in Smart Cities and Urban Analytics runs for 12 months full-time starting in September

Our academic staff are immersed in research involving smart cities as shown through their diverse range of projects and publications. Visit the mscsmartcities.org website to view their full profiles.

The part-time route allows you to undertake the course at your own pace, in up to 5 years

The **MSc (Master of Science)** degree is a postgraduate programme containing taught elements, compulsory and optional modules which are assessed, as well as a dissertation.

Companies such as Intel, IBM, ARUP and CISCO all have strategies around Smart City development, creating a demand for skilled personnel.

CASA has been in talks with all of these companies and CASA's Director sits on the newly-created Smart Cities Board at the Greater London Authority to advise the Mayor on developments.

A significant proportion of the programme is dedicated to equipping students with key quantitative practical skills such as mathematical and statistical modelling, computer programming, spatial analysis and cartographic visualisation, as these facilitate our understanding of Smart City data.

Importantly, these practical skills are underpinned by broad theoretical perspectives on the demographics, economics, form, function, network interactions, governance, policy, planning and crucially science of cities across the world. Engaging with the critical discourse surrounding the current interest in making our cities still 'smarter' is a vital element of the course.

This unique marriage of theory and practice means our graduates leave fully prepared to be the agenda setters in our future cities.

Our programme is suitable for graduates or experienced practitioners from a whole range of backgrounds but with a common interest in cities. We have current students with professional and academic backgrounds as diverse as architecture, computer science, environmental science, geography, planning, physics, mathematics, remote sensing, geomatic engineering and transport studies.



MSc Smart Cities and Urban Analytics

Term One - 45 credits

City Theory

will give you a comprehensive introduction to a theory and science of cities. Many different perspectives developed by urban researchers, systems theorists, complexity theorists, urban planners, geographers and transport engineers will be considered.

Quantitative

Methods will empower you with essential mathematical techniques to be able to describe quantitatively many aspects of a city. You will learn various methodologies, from traditional statistical techniques, to more novel approaches, such as complex networks. These techniques will focus on different scales and hierarchies, from the micro-level, e.g. individual interactions, to the macro-level

Geographic Information Systems and Science

aims to equip students with an understanding of the principles underlying the conception, representation/ measurement and analysis of spatial phenomena. It presents an overview of the core organising concepts and techniques of Geographic Information Systems, and the software and analysis systems that are integral to their effective deployment in advanced spatial analysis.

Optional Module - 15 credits

In addition to the modules above, students also choose one other relevant 15 credit module from across U

Term Three onwards - 60 credits

Dissertation

Term Two - 60 credits

Smart Cities: Context, Policy and Government

will give you a perspective of smart cities from the viewpoint of technology. It will provide a context for the development of smart cities through a history of computing, networks and communications, of applications of smart technologies, ranging from science parks and technopoles to transport based on ICT.

Spatial Data Capture, Storage & Analysis

will teach you the tools needed to manipulate and analyse the large datasets derived from urban phenomena. You will be able to build data structures, perform SQL queries, and apply data analysis methods in order to extract key trends and metrics on complex processes. Through this course you will learn how to use tools such as MySQL, Python and JavaScript in the capture, analysis and visualisation of your data.

Urban Simulation

will teach you to construct and apply models in order to simulate urban systems. These are key in the development of smart cities technologies. You will learn different approaches, such as land-use transport interaction models, cellular automata, agent-based modelling, etc., and realise how these are fashioned into tools that are applicable in planning support systems, and how they are linked to big data and integrated data systems.

Skills in a
range of computer
programming
languages will
be developed
throughout the
course



Andy Hudson-Smith

Andrew Hudson-Smith is Director of CASA and Reader in Digital Urban Systems and Editor-in-Chief of Future Internet Journal, he is also an elected Fellow of the Royal Society of Arts and a member of the Greater London Authority Smart London Board. Andy runs the Smart Cities: Context, Policy and Government module with Mike and guest speakers.



Mike Batty



Adam Dennett

Adam is Course Director of the MSc Smart Cities and Urban Analytics. A Geographer and Fellow of the Royal Geographical Society, Adam teaches the Geographic Information Systems and Science module and lectures on the City Theory module.



Hannah Fry



Ed Manley

Ed's background lies in the application of computational techniques to interdisciplinary domains, with a particular focus on urban systems. Ed runs the Spatial Data Capture, Storage and Analysis module, with Steven, teaching practical data skills in term two.



Elsa Arcaute

Michael Batty's latest book is *The New Science of Cities* (MIT Press, Cambridge, MA, 2013). Mike has received various honours for his work including a CBE in the Queen's Birthday Honours in June 2004 for 'services to geography'. Mike runs the Smart Cities: Context, Policy and Government module with Andy and also teaches Urban Simulation.



Sir Alan Wilson is Professor of Urban and Regional Systems at CASA and is Chair of the Home Office Science Advisory Council. He is currently Chair of the Lead Expert Group for the Government Office for Science Foresight project on the Future of Cities. Alan lectures on Smart Cities: Context, Policy and Government and Urban Simulation.

Alan Wilson

Hannah's research revolves around the study of complex social and economic systems at various scales, from the individual to the urban, regional and the global, and particularly those with a spatial element. Hannah leads the Quantitative Methods module in term one.



Martin Zaltz Austwick is Course Director of the MRes Advanced Spatial Analysis and Visualisation. Although Martin doesn't teach on the MSc in Smart Cities programme, he is involved in dissertation supervision and personal tutoring.

Martin Zaltz Austwick

Elsa's research focuses on scaling laws and on defining cities using different methodologies; from networks and percolation theory, to GIS tools. Elsa teaches on two modules: City Theory in term one and Urban Simulation in term two.



Steven is a spatial software developer, making visualising complex datasets on maps easier. He has over 10 years experience of professional software development and teaches these skills on the Spatial Data Capture, Storage and Analysis module with Ed.

Steven Gray

Entry Requirements

Normally a minimum of a second-class UK Bachelor's degree in an appropriate subject, or an overseas qualification of an equivalent standard. Candidates who hold a professional or other qualification obtained by written examinations and approved by UCL together with at least three years of appropriate professional experience may also be admitted.

English Language Requirements

If your education has not been conducted in the English language, you will be expected to demonstrate evidence of an adequate level of English proficiency.

The English language level for this programme is: Standard

Further information can be found on UCL's English language requirements page.



Applying for a place on our MSc Smart Cities and Urban Analytics programme is simple via UCL's online admission system.

First you need to decide whether you'd like to study full time (in one calendar year) or on a part-time flexible modular basis (between 2 and 5 calendar years).

Completed applications are forwarded to us for consideration by the course leader and academic staff who will make a decision on your suitability.

UCL's admissions office will send you the formal outcome of your application, and normally the whole process takes just a few weeks.


If you need any help at any stage of the process, please do not hesitate to contact our Teaching and Learning Administrator, Lisa Cooper either by email lisa.cooper@ucl.ac.uk or by telephone +44 20 3108 3327.

**Visit
mscsmartcities.org
for a link to UCL's
online application
form**

The Centre for Advanced Spatial Analysis is one of the leading forces in the science of cities, generating new knowledge and insights for use in city planning, policy and design and drawing on the latest geospatial methods and ideas in computer-based visualisation and modelling. We are part of The Bartlett: UCL's global faculty of the built environment.



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