

MSc in Computer Science and Applications

The **CSA MSc** is a research-led one-year taught course. It provides a choice from a range of advanced topics at the frontiers of Computer Science, together with their application to business, technology, science and education. The course has been designed for graduates with a Computer Science or scientific and computational background, and provides a solid preparation for the use of cutting-edge tools, techniques and technologies in an industrial or business setting. The course also provides an excellent grounding for further research, either through PhD study or in a commercial setting. There are approximately 25 places available, with a small number of scholarships offered for international students.

CSA adopts an interdisciplinary approach, and encompasses modules from areas that complement the core topics of Computer Science. Some of these modules address the application of advanced computing techniques to areas such as mathematics, science and education, and others the study of new fields such as computational and systems biology.

Students select approximately 6 modules from an extensive list of options in the first six months of the course, to be complemented by a module on research methods and a dissertation project. The modules available are reviewed and updated on an annual basis to take account of topical developments in Computer Science research and applications. More detailed descriptions are available online at [w go.warwick.ac.uk/csa-msc](http://go.warwick.ac.uk/csa-msc). The following list gives a brief introduction to the modules available at the time of writing.

■ Multimedia Processing, Communications and Storage

Provides in-depth knowledge of digital multimedia storage and communications technologies: including data acquisition, compression, interpretation, presentation and interaction. Gives practical experience of programming components of multimedia systems.

■ Agent-Based Systems

An advanced introduction to agent-based systems, covering theoretical foundations, recent research and practical deployed applications. Describes fundamental techniques and systems, illustrated by real-world applications.

■ High Performance Computing

Introduces the hardware design of modern parallel computing platforms and the corresponding programming models. Covers principled methods for measuring and characterising performance, and issues such as administration, scheduling, and data management.

■ Advanced Specification Methods

Studies methods for designing, analysing and programming complex computing systems. Considers techniques for the specification, design, and implementation of such systems throughout the software lifecycle.



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Department of Computer Science ■ University of Warwick ■ Coventry CV4 7AL

■ m-sc-admissions@dcs.warwick.ac.uk ■ [+44 \(0\)24 7652 2424](tel:+4412476522424)

■ Introduction to Empirical modelling

Introduces an alternative conceptual framework for computing with wide applications in business, engineering and education. Involves the study of principles and tools for explanatory and exploratory modelling based on the fundamental concepts of observables, dependency and agents.

■ Computational Biology

An overview of research methods and technologies in computational biology and bioinformatics. Includes topics such as finding genes in DNA sequences, interpreting gene sequences, protein classification, data mining for gene and protein expression patterns, and modelling cellular interactions and processes.

■ Algorithmic Game Theory

Covers game theory as a formal method for strategic interaction. Discusses the algorithmic and computation complexity aspects of game-theoretic models with a focus on recent advances and current research.

■ Dynamic Web-based Systems

Introduces advanced concepts in web-based systems, such as adaptive hypermedia, adaptive web-based systems, authoring, the semantic web, the social web and applications.

■ Data Mining

An overview of data mining techniques, including algorithms developed to address different data mining goals and the application of these algorithms to real-world problems.

■ Modelling and Simulation

Addresses data handling, data mining and data analysis with emphasis on biological problems. Includes translating biological problems into mathematical models, and the biological interpretation of such models. Discusses the wider issues of the status of modelling in modern science.

■ Computation 1: Numerical Methods

Focuses on numerical methods for data analysis, modelling and simulating dynamical processes. Discusses the application of specific numerical techniques to various standard scientific problems, such as image analysis.

■ Computation II: Molecular Methods

Introduces molecular modelling techniques as applied to biological systems, with particular emphasis on the methods used and their underlying theory.

■ Monte Carlo Methods

Covers the foundations and advances in Monte Carlo simulation techniques. Introduces a collection of simulation methods, and their advantages, disadvantages, strengths and pitfalls for scientific applications.

■ Linear Algebra and Optimisation

Introduces standard Linear Algebra Libraries and discusses problem formulation in terms of Linear Algebra Operations. Provides an overview of the central mathematical ideas behind algorithms for the numerical solution of optimization problems.

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