

## **Multiagent systems and electronic institutions**

This subject introduces students to the concept of agent organisations and electronic institutions. Virtual Institutions are software systems composed of autonomous agents, that interact according to predefined conventions on language and protocol and that guarantee that certain norms of behaviour are enforced. This view permits agents to behave autonomously and take their decisions freely up to the limits imposed by the set of norms of the institution. An important consequence of embedding agents in a virtual institution is that the predefined conventions on language and protocol greatly simplify the design of the agents. A Virtual Institution is in a sense a natural extension of the social concept of institutions as regulatory systems that shape human interactions. Social concepts like roles, norms, and institutions are gaining momentum in software design as a way to cope with the increasing complexity of software systems. Students will gain knowledge on the basic notions of agent computing and multiagent systems design and on the social and organisation-based models used to build such systems. The most relevant approaches to autonomous agent organisation will be reviewed and students will receive an state-of-the-art view of one of the currently most important developments in programming techniques. Given the pervasive nature of agent computing in software engineering and IT, this subject will give students a modern and competitive perspective on software design.

### ***Objectives***

1. To present the underlying concepts of agent technology.
2. To review selected organisation-based approaches for multiagent system building.
3. To acquire experience in developing electronic institutions.

At the end of the subject students will be capable of specifying multiagent systems as electronic institutions. This subject introduces students to fundamental concepts in multiagent systems design.

### ***Tutorial Content***

- 1) Introduction to Autonomous Agent and MAS concepts. Concept of agent, Game theory, Co-ordination mechanisms, agentprogramming languages, agent architectures.
- 2) Basic organisational concepts. Roles, protocols, norms.
- 3) Organisational paradigm. Holonic systems, Coalitions, Teams, Societies, Federations, Markets
- 4) Electronic Institutions. Basic concepts, tools, examples.

***Tutorial Language:*** English

This subject is designed for all students interested in electronic business and business systems. An electronic institution can represent a market in which agents trade, or any real institution, such as a hotel, in which the agents represent the players (in such an application a 'scene' represents a guest checking-in to the hotel). This powerful paradigm enables agent-based systems to be deployed in commercial applications to deliver secure performance at a reasonable cost.

***Presenter***

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Carles Sierra is a Senior Research Professor with the Spanish Research Council and is located at their Artificial Intelligence research laboratory in Barcelona. He is an Adjunct Professor at UTS, Sydney. He has been involved in the design and implementation of electronic markets and multiagent systems since the early 1990's

For further details check <http://www.iiia.csic.es/~sierra>