

**Seminario**  
**“Molecular and Cellular Computing”**

Profesor invitado: **Martyn Amos**

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**SEMINARIOS UPM**  
Curso 2009 - 2010  
**Máster en Inteligencia Artificial**

**PROGRAMA**

**Molecular Computing**

Historical motivation/background: traditional silicon-based computers and Moore's law. Adleman's original molecular computing experiment (with appropriate biological background). Formal models of molecular computing (filtering, splicing, membrane). Subsequent laboratory implementations.

**The Transition from in vitro to in vivo**

Molecular self-assembly (Winfree, Rothemund, etc.) Complexity issues in DNA computing. Brief introduction to microbiology, gene regulation, etc. The genome project(s) and systems biology. The emergence of synthetic biology and biological engineering. Early experiments (Elowitz & Leibler, etc.)

**Biological Engineering**

The development of synthetic biology into a fully-fledged scientific discipline. Engineered cellular communication and directed pattern formation (Weiss). Circuit evolution. Bacterial cameras. Minimal genomes. Biobricks and infrastructure (iGEM, etc.) Social and ethical issues. Challenges and opportunities.

**Materials**

All students will be given a CD-ROM containing

1. PDF copies of all of the papers referenced in the lectures
2. Copies of the slides used
3. An extensive bibliography

**Referencias**

Scientific books:

Martyn Amos; Theoretical and Experimental DNA Computation, Springer, 2005.

Martyn Amos (Ed.); Cellular Computing, Oxford University Press (USA) (2004).

Popular science book for general audience:

Martyn Amos; Genesis Machines: The New Science of Biocomputing, Atlantic Books (2006).