TU/e Honors Class Informatics

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12, 19, & 28 May, 2 & 16 June, 2014

The *Honors Class Informatics* consists of five evening lectures about information and computation as fundamental scientific concepts. Informatics is a relatively young discipline that now has gained its own place in science and engineering. Paul Rosenbloom (and others) named Computing the *Fourth Great Scientific Domain*, next to the

- Physical Sciences,

- Life Sciences, and

- Social Sciences.

The fourth domain consists of the Computational Sciences (Informatics), subsuming Software Science, Systems Science, Web Science, Data Science, etc.

Computational methods have been called the *Third Pillar of Scientific Methodology*, next to

- Experimental methods and

- Theoretical methods.

Others disagree here, and state that both theory and experiment are nowadays 'thoroughly computational' . Besides explaining these developments, we address in this honors class the following questions about information and computation.

- What is information? How can you measure and organize information?

- How can scientific theories and models be viewed as data types?

- What is randomness, unpredictability? When and how can you compress information?

- How can you protect information? Against accidental errors? Against malicious manipulation? Against unauthorized access?

- What computational mechanisms exist? How do they differ? Finite automata, push-down automata, cellular automata, Turing machines, lambda calculus, molecular (DNA) computers, quantum computers; universality.

- What is an algorithm? How can you express algorithms?

- Are there limits to algorithmic computability? If so, which?

The aim of this honors class is to broaden your perspective on these topics, so that you can better apply them in your own field and can communicate better with informatics experts.