



Nell'ambito del programma di dottorato del DMI

**il Dott. Roberto Tonelli, PhD**

**Department of Mathematics and Informatics (DMI)**

**Cagliari University**

**terrà un corso breve dal titolo:**

## ***Power Laws in Software Systems***

*30 Marzo 2017, ore 15.00 – 19.00, 31 Marzo 2017, ore 15.00 – 19.00*

**(Lab. M - Dip. di Matematica e Informatica, via Ospedale 72)**

***The course is divided into two parts:***

### **Power-laws in software systems**

Complex systems grow and evolve in the form of intricately networked organizations. A recent finding is that the distribution of edges connected to vertexes follows a power-law, also called Pareto distribution. The same behavior can be found in the graphs associated to large software systems. The entities involved in software development (classes, interfaces, methods, etc.) are also characterized by features whose distribution can be studied looking for scale-free behavior. In the course we will describe the properties of power-laws, some of their generative mechanisms and their application to real-world large object-oriented software systems.

### **Applications of complexity theory to software systems**

Many software systems have such a huge dimension that it looks sensible to treat them using stochastic approaches, such as the random graph theory. In the seminar we will describe recent findings on such complex systems and their application to software systems. We will also present the time evolution of the fractal dimension during system growth, and its significant correlation with object-oriented complexity metrics known to be related with software fault-proneness. We'll show that in software systems the fractal dimension could be considered as a measure of internal complexity, and consequently of the system quality.

***Roberto Tonelli*** is a Researcher at DMI (Department of Mathematics and Informatics) at Cagliari University and he is currently Professor for Statistics at Economics. He has been Professor of Informatics, Physics and Mathematics at University of Cagliari. He has published over 90 Conference and Journal papers related to complexity, software systems, simulation modeling and empirical studies. He owns two PhDs (Physics and Software Engineering) and he is a Fellow of various scientific associations.