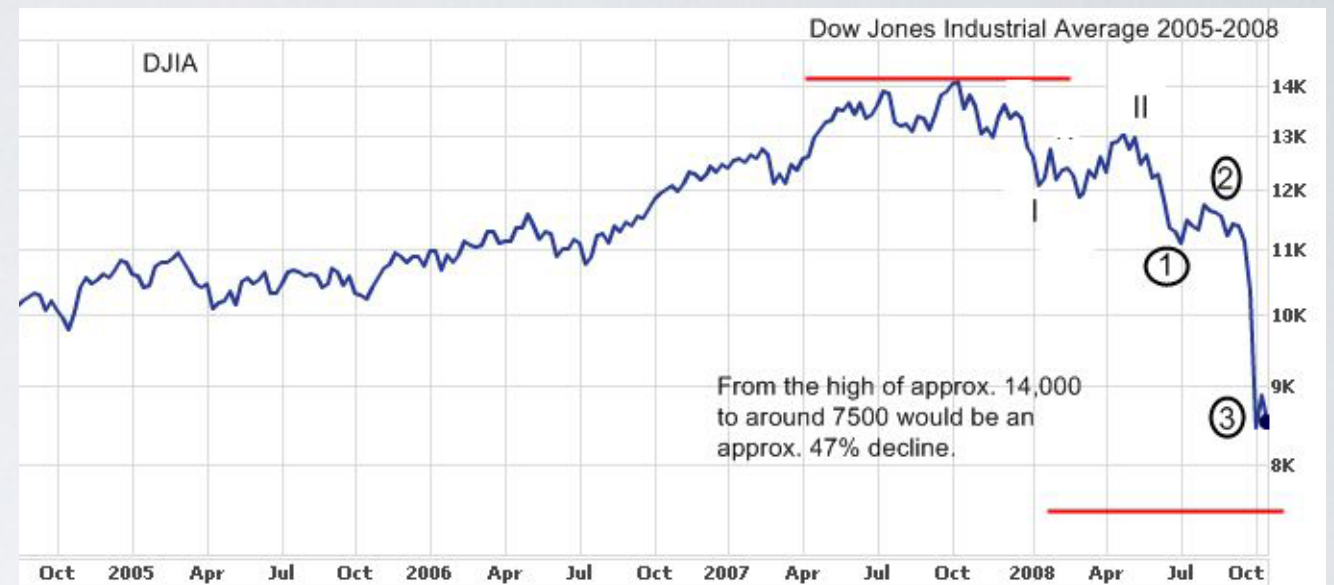


# (PHYSICS AND) METHODS FOR COMPLEX SYSTEMS (PHYS 520)

Spring 2017

**Complex systems** – which involve many different scales and interactions as well as randomness, and are capable of collective behavior – share properties that are largely independent of the discipline where they would traditionally be studied. To cite but one example, earthquakes and stock market crashes, while of course fundamentally different as far as their underlying mechanisms are concerned, exhibit largely analogous features when studied from a statistical point of view. Remarkably, these features are best described using the formalism of physicists' **quantum mechanics**.



Variation of the DJ index in the 2008 crash

In general, physics, with its historical emphasis on model building and development of new tools, is particularly well suited to the study of **universal properties of complex systems**. The purpose of this course is to give a general introduction to this study for motivated graduate students from physics and elsewhere. The technical level will be rather introductory, and only a basic knowledge of statistical and quantum mechanics will be necessary. The course will draw on many examples from finance, earth science, biology, linguistics and physics, emphasizing **universality** and the corresponding general strategy of **model building**.

## Scheduling:

The class will follow an intense schedule with meetings on T and Th from 3.30 to 6.20 pm. First class will be on Jan. 17th, last class on March 28th. For further information contact Prof. H. Saleur: [saleur@usc.edu](mailto:saleur@usc.edu)