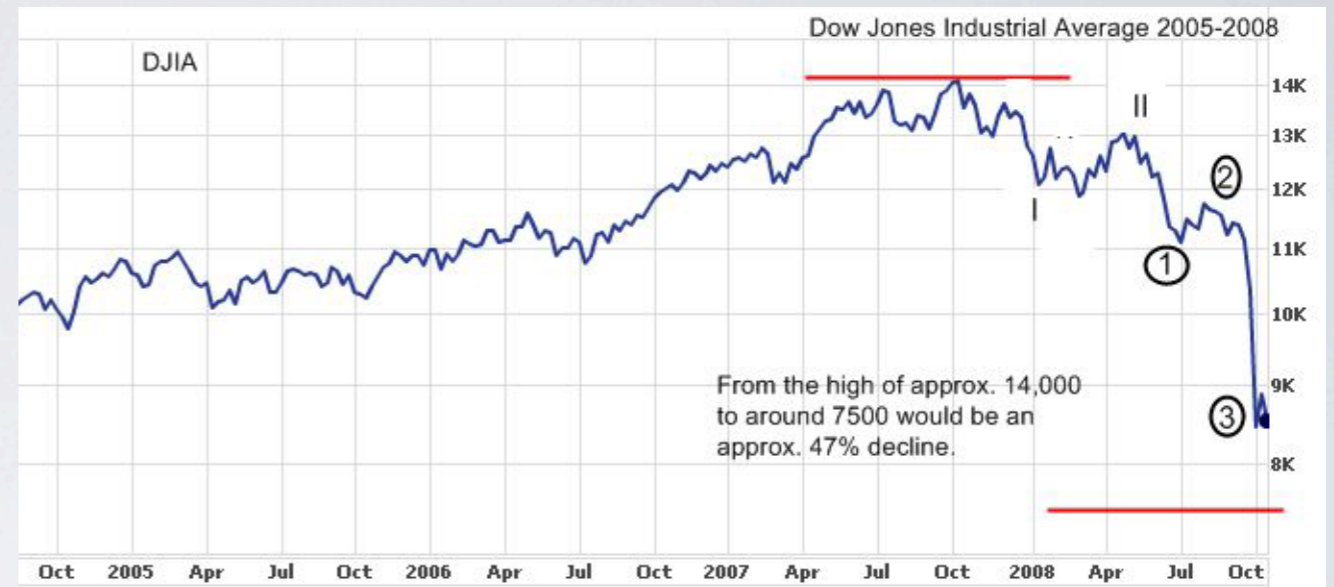


PHYSICS AND THE STUDY OF COMPLEX SYSTEMS (PHYS 720: SELECTED TOPICS)

Spring 2014

Complex systems – which involve many different scales and interactions, 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 physicist's **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 of two 3-hour classes per week starting the week of January 20th until mid spring. For further information contact Prof. H. Saleur: saleur@usc.edu