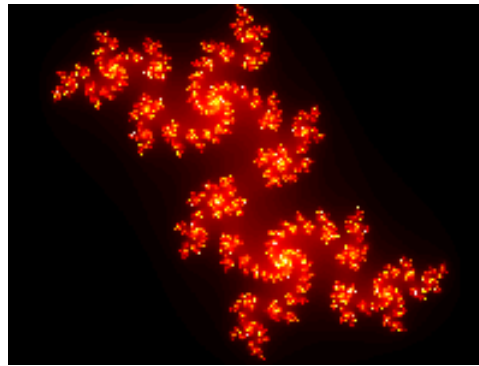


**COMPLEXITY A NEW SCIENCE OR
A NEW DIRECTION IN SCIENCE?
WHAT TO DO ABOUT IT?**



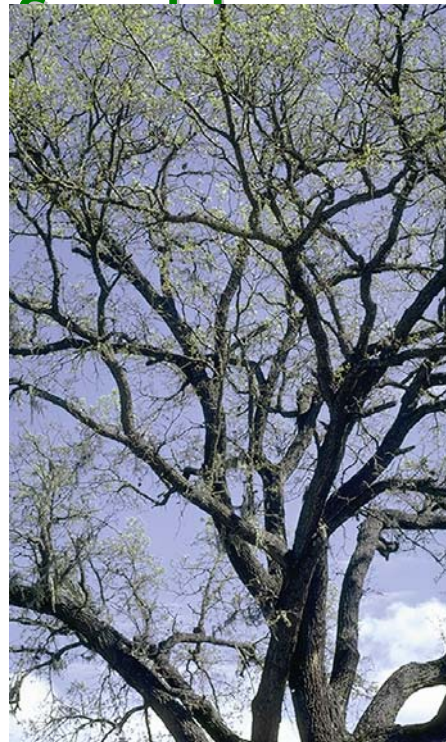
**Tassos Bountis
Department of Mathematics
University of Patras**

Complexity, is the study of **complex systems**,
i.e. **systems that:**

- a) Consist of **many interacting components** and
- b) Can exhibit **unpredictable behavior** and **self-organization**

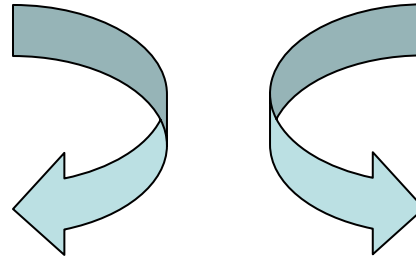
Complex systems are **Complexity**

- **Physics**
- **Chemistry**
- **Biology**
- **Economics**
- **Sociology**
- **Engineering**

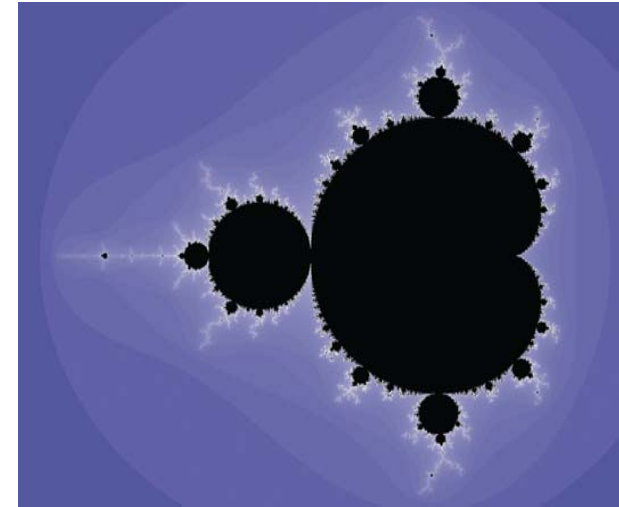
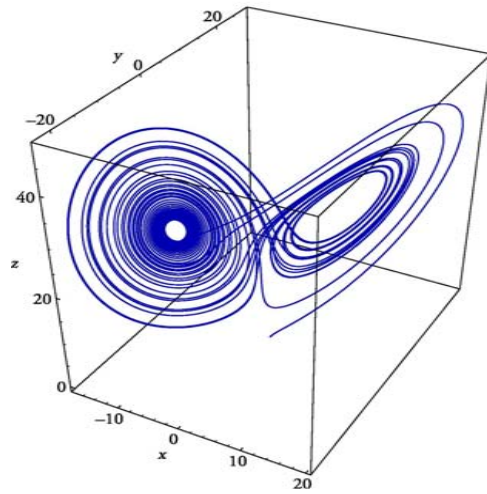


THE FOUNDATIONS OF COMPLEXITY

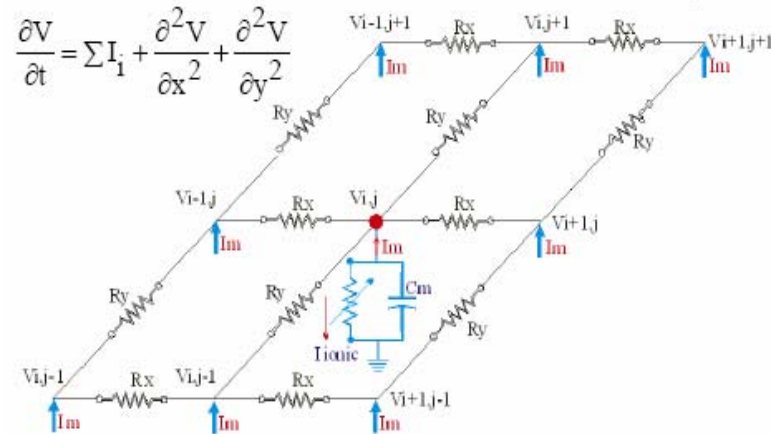
Chaos Theory



Fractal Geometry



..and
Computation!



To understand complex systems, one must follow a curriculum of basic study:

a) Mathematics

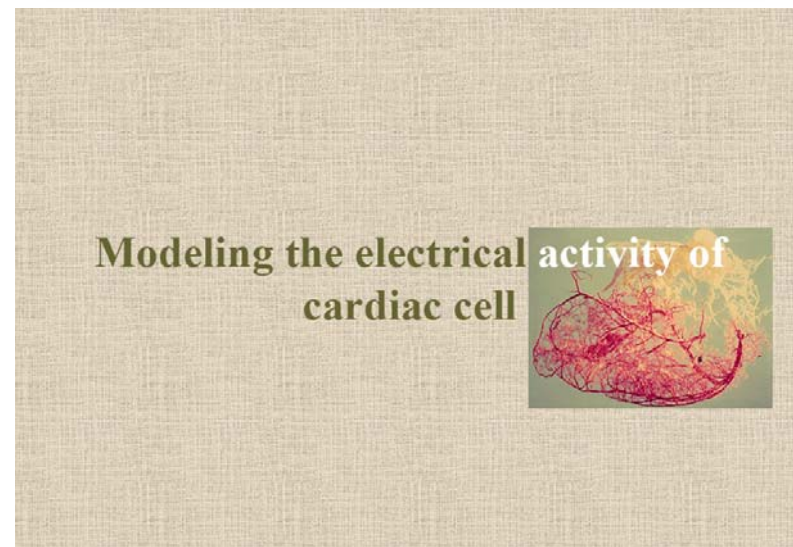
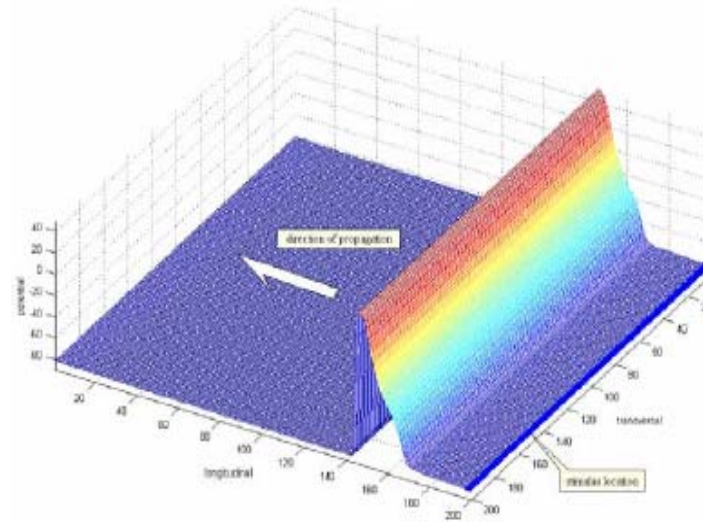
- Dynamical Systems
- Chaos and Fractals
- Networks and Algorithms

b) Physics

- Classical Mechanics
- Statistical Physics
- Stochastic Processes

c) Chemistry and Biology

- Chemical reactions
- Cell functioning
- DNA structure



A European Initiative in Complexity must:

1) Organize Educational Activities

- a) Establishing Training Networks leading to M.S. degrees
- b) Supporting Ph.D. Schools and Workshops

2) Institute Research Programs

- a) Defining research areas in Complexity
- b) Launching calls of proposals on Complex Systems

3) Disseminate Information

- a) Helping establish Complexity Institutes and Centers
- b) Supporting e-learning and education from a distance

Our primary aims must be:

- Increase the level of **theoretical knowledge and scientific experience**
- Foster international and **interdisciplinary scientific cooperation**
- Help in exploring **complex social system behavior** in European society
- Improve **employment opportunities** of European youths
- Enhance **mutual understanding and awareness of cultural and environmental issues** in Europe

In Greece, we have organized since 1987:

- 20 Summer Schools (2 weeks each)
 - 4 International Conferences
- on “Nonlinear Science and Complexity”.

The result:

- Hundreds of Greek undergraduates learned about **the basic notions of Complexity** and their applications
- Tens of Greek graduates **obtained their Ph.D.s in Complexity related topics** and are now **accomplished researchers and teachers in Europe**
- Aspects of **dynamical systems, chaos and fractals** have been introduced in many courses in Greek universities