Analysis of Biological networks,

Course number: **001-2-2046**

Lecturers: Prof. Aaron Fait

Course credits: 3 (3hours weekly)

Course exam: Oral presentation and one assessment during the semester

Course description:

The course provides an introduction to complex data analysis via network approaches. Students will learn terms to describe processes in biology using graph theory terminology, develop and analyze processes and explore the properties of networks. The course approach is descriptive, the elucidation of statistical tools.

Syllabus:

1. The birth of networks
    a. The power of connectivity
    b. Benefit and vulnerability
    c. Systems theory and complexity
    d. Examples
2. Graph theory
    a. Euler
    b. Definitions
    c. Matrix and graph
    d. Properties
3. Simple and bipartite networks
    a. Subgraph properties
4. Mpdels
    a. Erdos Renyi
    b. 6 degrees
5. The city and Weak ties of Granovetter
6. Watts and Strogatz Model
7. Hubs and the oracle of Bacon
8. Power law at the basis of the Barabasi network
9. Scale free networks and properties
    a. Centrality indices
    b. Examples
10. The node
    a. Fitness and competition
    b. Bose gas network
    c. The winner takes it all.