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**From molecules to behavior: The biology of the brain**

**Prof. Edi Barkai**

**Course Number:**

**Class Time:** Tuesday 15-18

**Class Location:** TBA

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**Course Description:**

This course is designed for students whose major subject is not one of the natural sciences disciplines. The aim of the course is to present the fruits of the enormous efforts natural scientists have been investing to give a mechanistic description of the human brain function. Emphasis will be placed on the reductionist approach taken by natural science when approaching the task of understanding human behavior, the achievements made with this approach, as well as its problems and shortcomings.

The first part of the course includes basic concepts of biology such as cell, protein, membrane and genes, all of which are necessary to understand the language of the biologist. An in-depth description will be given on the unique actions of the nerve cells in our bodies, and how this action allows the use of electrical activity in information transition and processing.

Subsequently, the mechanisms by which nerve cells communicate and influence each other, to create neuronal ensembles action groups and control them will be discussed. It will be demonstrated how and why research on animals, even species that are at a low evolutionary stage, is instrumental for understanding our minds.

The second part of the course describes scientists' attempts to show how the activity of groups of neurons in the workings of the brain is manifested in behavior. A detailed example will be studied for one major brain systems, the motor system. An emphasis will be given on discussing the strength and limitations of the natural scientists' approach, which seeks to show a causal link between the individual molecules changes the organism acts.

Based on knowledge learned in the first two parts, the third part will concentrate on description of complex activities, health and pathologies of the human brain. They topics discussed will be learning and memory, pain, mental health, aging diseases and addiction.