# FDITE112 Bioelectronics

**(A. Dér)**

**Description:**

The course introduces students to the basics of this discipline, which is located at the border of biology, physics and informatics and has started to develop in recent decades. Some of its branches are related to basic biophysical research, while other branches are related to applied electronics and bionics.

**Topics:**

Inter- and multidisciplinary sciences; Janus-faced bioelectronics

Electrical phenomena at different levels of organization of biological matter

> Electrical changes accompanying muscle and nerve function, energy conversion and signal transmission processes of tissues and cells; the role and electrical field structure of biological membranes; ion pumps and ion channels; the functioning of energy converting membrane proteins; methods of measuring bioelectric signals and their interpretation; traditional and alternative electrophysiological techniques; applications (brain-computer interface, bionic hand, optogenetics, analysis of human movement)

Possible information technology applications of biological matter; biomolecular electronics

> Main stages of the development of electronics and information technology (Moore's law); new materials and principles (CNN chip); molecular electronics; optical communication and photonics; comparison of nonlinear optical properties of proteins and semiconductors; integrated optics, photonic applications of biomolecules (ultrafast integrated optical switching, biosensors)

***Recommended literature:***

Fundamentals of Biophysics (eds.: Rontó Gy. and Tarján I.) Semmelweis Kiadó, 1997

Damjanovich S., Fidy J., Szöllősi J.: Medical biophysics, Medicina Kiadó, 2006

Vsevolodov, N.: Biomolecular Electronics, Birkhauser, 1998

Bioelectronic Applications of Photochromic Pigments (eds.: Dér A. and Keszthelyi L.)

IOS Press, 2001