

# **Introduction to Electrophysiological Instrumentation**

By Dr. Anton Sheinin

The course (workshop) could be relevant to the students (M.Sc. and Ph.D.) that use electrophysiology in their research. During the course, the main principles of electrophysiological measurements will be discussed. The students will get a hands-on experience in building a simple electrophysiological amplifier.

Credit: 2 academic hours, five (5) days during summer.

Student evaluation: a) lab grade (20%); 2) exam, multiple choice questions (80%).

Prerequisites: basic physics (electricity).

Language: Hebrew or English

## **Course topics:**

- I. Overview of electrophysiological instrumentation. Types of electrophysiological recordings.
- II. Basic principles of electricity. Passive electronic components.
- III. Active electronic components. Semiconductors.
- IV. Transistor as a switch and amplifier.
- V. Operational amplifier. Basic applications of an operational amplifier.
- VI. Amplifier for extracellular recordings. Amplifier for intracellular recordings. Electronic design of patch clamp amplifier.
- VII. Noise pickup and cancellation. Signal conditioning.
- VIII. Acquisition hardware. Digitizers.

## **Literature:**

- 1) The axon guide. A guide to electrophysiology and biophysics laboratory techniques. Rev. C. MDC Analytical technologies.
- 2) Single channel recordings, by Bert Sakmann and Erwin Neher. Springer, 2<sup>nd</sup> edition, 1995.
- 3) Basic electronics for scientists, by James J. Brophy, 1972.

- 4) Electronics for the modern scientist, by Paul B. Brown, Gunter N. Franz and Howard Moraff, 1982.