Category （科目区分）	Cluster common basic subjects		
Course Title （授業科目名）	Basic medical technology training "Principles and practical techniques of patch clamp method"		
Instructors （担当者名）	Takafumi Miki	Academic Year （配当年次）	1
Required Course / Elective Course （必修/選択）	Elective Course	Credits （単位数）	1
Class Format （授業形態）	experimental practice		
Schedule （開講期間）	Students will be notified by email after completing the course registration.		
Class Date/Period （開講曜日・時間）	Students will be notified by email after completing the course registration.		

Course Outline/ Course Objectives（授業の概要・到達目標）

Purpose of the class: The purpose of the class is to understand the principles of the patch clamp method through observation and practice of electrophysiology studies carried out daily in the laboratory of the cell physiology course.

Achievement goal of class:
1. to understand the principle of the patch-clamp experimental method and to explain the voltage and current clamp methods.
2. be able to adjust the solutions (intra-electrode solution and extracellular fluid) required for the patch-clamp experiment.
3. record action potentials from excitable cells.
4. record ionic currents and membrane capacitance in the main mode of the patch-clamp method (whole-cell recording).
5. analyze and understand the patch-clamp experimental data.

Class outline:
1. Learn about the measurement principle of the patch-clamp method and the actual measurement equipment.
2. Learn about the composition and preparation of experimental solutions for cells (cultured cells or acutely isolated cells) used in the cell physiology course.
3. Learn how to operate the micromanipulator required for patch-clamp experiments.
4. Learn how to record the membrane potentials in the current-clamp mode.
5. Record the main ionic current systems of the cell by whole-cell recording.
6. Experience the membrane capacitance recording method and understand the exocytosis and endocytosis mechanisms of secretory cells.

Course Planning（授業計画）

	Course Outline/ Course Objectives（授業の概要及び到達目標） （Contents of Class）　（（授業内容））	Instructor （担当教員名）	Department （講座名） Class Room 〔実施場所〕
1	Principle of patch clamp experiments	Takafumi Miki	Cell Physiology [Laboratory of the department of cell physiology]
2	Handling of patch clamp equipment		
3	Solution adjustment and electrode preparation		
4	Membrane potential measurement and action potential recording		
5	Whole cell recording and analysis method 1		
6	Whole cell recording and analysis method 2		
7	Whole cell recording and analysis method 3		
8	Whole cell recording and analysis method 4		
9	Membrane capacitance recording and analysis method 1		
10	Membrane capacitance recording and analysis method 2		

Grading Criteria （成績評価の基準と方法）

30 hours of practical training in the seminar room (laboratory) + 15 hours of self-study, totaling 45 hours, will be one credit, and the evaluation will be made in consideration of the attendance status and the contents of the submitted report.

Contact Information（問い合わせ先(氏名，メールアドレス等)）

Name：Takafumi Miki　/ E-mail： tmiki@med.akita-u.ac.jp

Comment （その他特記事項）

Information on courses: If you are a graduate student of a working adult and cannot attend the training due to work, etc., we will adjust the schedule.
Textbooks / References: Distribute materials as needed. Alternatively, specify the document.
Self-study content during self-study time: It is desirable to carry out preparatory learning according to the goals and lesson content.