

**Molecular signaling pathways in synaptic plasticity**  
Course Information and Syllabus  
Spring 2020

Course Organizer: Dr. Oliver Schlüter  
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(e-mail works best)

Class Schedule: Tuesday/Thursday 10:00 - 11:15 am; room 158, Benedum Hall  
Office consultations: contact by email as needed to schedule appointment. E.g. Wed. 9-10am

**Course Objective:** This class focuses on signaling mechanisms, which underlie long-term synaptic plasticity. It will address the molecular pathways, which regulate thresholds for synaptic plasticity, the synaptic machinery for induction and expression of long-term synaptic plasticity, and how it is converted to structural changes of the neural network. The goal is to get a basic understanding of the molecular steps of signaling leading to synapse strengthening as the cellular correlate of learning and memory. The presentations will be guided by experimental approaches, which have influenced the conceptual framework.

Students completing this course should:

- understand the basic principles of signaling pathways in the synapse and neuron
- understand how these signaling pathways are linked to long-term synaptic plasticity and memory
- start to identify experimental questions addressing aspects of synaptic plasticity and formulate experimental approaches to test them

Course Website: Information and documents pertinent to the course can be found at <http://courseweb.pitt.edu>.

### **Organization of Course Content**

Class will be organized by topics.

Tentative topics are: Introduction/Repetitorium of long-term synaptic plasticity  
Synaptic tagging and memory correlates  
Gating of long-term synaptic plasticity and the coincidence of three signals  
The postsynaptic density as a hot spot for synaptic signaling  
Local protein translation in dendrites

The CaMKII protein family and calcium signaling  
G-protein coupled signaling  
Metabotropic glutamate receptor signaling  
Adenylyl Cyclase signaling  
Signalosomes and signaling specificity  
Specifics and limitations of different experimental approaches to identify the function of proteins

## **Course Requirements**

### Weekly reading assignments:

posted on webcourse, 0-3 hrs/week time commitment outside of class

### Lecture prerequisites:

Intro to Neuroscience  
Synaptic Transmission  
(Synaptic Plasticity, recommended)

## **Exams**

Written exam at middle and end of course, based on course content  
Example quizzes will be provided for lectures, which will be discussed at the beginning of the next class.

## **Grading Policy**

Attendance and class discussion, including quizzes contribution 20% and exam 80%

## **Policy on late work and make-ups**

Late work and make-ups are only available for special requests.