

Synaptic Neurochemistry

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Course number: **27-595-01**

Lecturer: **Prof. Ed Stern**

Second Semester

Hours: 3 h/w – 1.5 credit points

Course goals:

The purpose of the course is to familiarize the students with the neurochemistry of the neurotransmitter systems of the Central Nervous System. The course will cover basic concepts of synaptic transmission, neurotransmitter biochemistry and receptor pharmacology.

Course content:

This course will familiarize the students with the basic neurotransmitter systems in the mammalian brain. The emphasis is on the biochemistry, anatomy, physiology, and pharmacology, and functions of the systems.

Classes format:

The course will consist of 13 frontal lectures. As the students come from a variety of backgrounds, they will be expected to supplement the course as needed by reading the appropriate chapters from the book: **The Biochemical Basis of Neuropharmacology**, 8th

edition, by Cooper, Bloom, and Roth. Other readings and supplements will be given as needed.

Detailed lecture plan:

As the students' background is variable, the lecture list is approximate. In each lecture on specific neurotransmitters, examples will be given of behaviors determined by the transmitters and their agonists and antagonists.

Class #	Topic	Reading required	Notes
1	Basic review of synaptic transmission		History of the study of synaptic transmission and neurochemistry, basic concepts of neurochemistry and pharmacology
2	Research methods in neurochemistry		Overview of the methodologies used to study neurotransmitter systems
3	Chemical neurotransmission: history of concepts, categories of neurotransmitters		Different types of neurotransmitters, how neurotransmitters are categorized: Neuromodulators vs. excitatory and inhibitory neurotransmission.
4	Neuromodulators I: The "first" neurotransmitter: Acetylcholine		Synthesis and removal of Ach. Receptor types: agonists and antagonists. Central cholinergic systems.
5	Neuromodulators II: Dopamine		Synthesis of catecholamines. DA receptor types: agonists and antagonists. Central dopaminergic systems systems.

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| 6 | Neuromodulators III:
Norepinephrine | NE receptor types: agonists and antagonists. Removal of catecholamines and indolamines. |
| 7 | Neuromodulators IV:
Serotonin | Synthesis of 5-HT.

5-HT receptor types: agonists and antagonists |
| 8 | Neuromodulatory systems | Summary of the different CNS neuromodulatory systems with emphasis on behavioral neuroanatomy. |
| 9 | Amino Acid
Neurotransmission I: General | Discovery of AA neurotransmitter systems,

Glycine, GABA, Glutamate, Aspartate |
| 10 | Glutamatergic
neurotransmission | Synthesis and removal of Glutamate.
Types of glutamatergic receptors: agonists, antagonists |
| 11 | GABAergic neurotransmission | Synthesis and removal of GABA. Types of GABAergic receptors: agonists, antagonists |
| 12 | Interactions among
neurotransmitters | Examples of interactions among neurotransmitter systems in behavior |
| 13 | Summary | |

Course assignments

Requirements

The students will be expected to attend the lectures. This will be a factor in the grade, as there is no exam.

Final grade

The principal determinant of the grade will be a project, which is to be handed in at the end of the course. This will take the form of a research proposal of a study involving some aspect of a neurotransmitter system, The student will have wide latitude in choosing the type of study: whether behavioral, biochemical, electrophysiological, neuroanatomical, pharmacological, etc. The proposal will be in a fixed format, to be distributed to the students. The proposal will be written in English. The student will be required to generate hypotheses, general and specific aims, and describe the methods which (s)he will use to perform the study. A two-page background will also be required, with a thorough reference list.

During the course of the semester, the students will be required to submit the topic ahead of time, and strongly encouraged to discuss the project with the instructor.

Bibliography

Cooper, Bloom, and Roth: The Biochemical Basis of Neuropharmacology, (Eighth edition), Oxford University Press

תאריך עדכון אחרון : 05/01/2023

פיתוח:

אגף תקשוב, אוניברסיטת בר-אילן

הצהרת נגישות

מדיניות פרטיות

אקדימה בר-אילן

כל הזכויות שמורות: המרכז הרב

תחומי לחקר המוח ע"ש גונדה |

אוניברסיטת בר אילן רמת גן

5290002 | טלפון: 03-5317755 |

פקס: 03-7384173 | יצירת קשר

