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UNIVERSIDADE FEDERAL FLUMINENSE
INSTITUTE OF BIOLOGY
GRADUATE PROGRAM IN NEUROSCIENCES

SUBJECTS DESCRIPTION OF THE GRADUATE COURSE IN NEUROSCIENCES

Name: Neuronal Electrical Activity
Code: EGB10007
Professor in Charge: Elizabeth Giestal de Araújo
Assistants:
Credit hours: 60
Credits: 2

Level:
X Master
X
Doctorate
X

Subject Description:

“Resting potential: Concept of diffusion across the membrane; Fick's law; diffusion potentials; equilibrium potentials; the Nernst equation; ionic bases for membrane potentials; genesis of the membrane potential; the sodium and potassium pump; the importance of pump activity. Action potential: The nervous impulse; characteristics of the action potential; the ionic bases of the action potential; the properties of the action potential; the voltage clamp technique; the patch clamp technique; mechanisms for propagating the action potential; saltatory conduction; extracellular record of action potential. Synaptic transmission: Neuromuscular junction; neuromuscular junction morphology; neurotransmitter molecules; stages of synaptic transmission; motor plaque potential; characteristics and properties of the plaque potential; microphysiology of the neuromuscular junction; Neuron - neuron synapses; synaptic junction morphology; types of neuron-neuron synapses; excitatory and inhibitory synapses; characteristics of the excitatory and

inhibitory postsynaptic potential; facilitation and occlusion mechanisms; genesis of the action potential in the postsynaptic membrane; synaptic inhibition mechanisms"

Bibliography:

Basic textbooks recommended.
1. Principles of Neural Science - Kandel et al., 2014. Fifth Edition. ISBN-13: 978-0071390118
2. Neuroscience - Dale Purves et al., 2018. Sixth edition. ISBN-13: 978- 1605353807
3. Neuroscience: Exploring the Brain. Mark Bear et al., 2015. Edição: Fourth, North American. ISBN-13: 978-0781778176
4. Molecular Biology of the Cell. Bruce Alberts et al., 2015. Sixth edition. Editora: Garland Publishing; ISBN-13: 978-0815344322
Classic articles
1. Luigi Galvani and animal electricity: two centuries after the foundation of electrophysiology - Marco Piccolino. TINS Vol. 20, No.10, 1997
2. A brief historical perspective: Hodgkin and Huxley - Christof J Schwiening. J Physiol. 2012 Jun 1; 590(Pt 11): 2571-2575.

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MASTER AND DOCTORATE

UNIVERSIDADE FEDERAL FLUMINENSE
INSTITUTE OF BIOLOGY
GRADUATE PROGRAM IN NEUROSCIENCES

SUBJECTS DESCRIPTION OF THE GRADUATE COURSE IN NEUROSCIENCES

Name: Biological Bases of Animal Behavior Code: EGB10041
Professor in Charge: Pablo Pandolfo
Assistants:
Credit Hours: 60
Credits: 2
Level:
X Master X
Doctorate X

Subject Description:
Discussion of historical aspects; concepts regarding the formation and expression of behavior; neural substrates and neurotransmitters that underlie the behavior; genetic, phylogenetic and ontogenic participation of behavior; experimental protocols and their possible inferences with pathological conditions

Bibliography:
Classic and recent articles from the area that may be updated annually. Such as
1. Alcock, J. (2009]. Animal Behavior: An Evolutionary Approach, Ninth Edition.
2. Arakawaa (2018). Ethological and multi-behavioral analysis of learning and memory performance in laboratory rodent models. Neuroscience Research 15:889
3. Bateson, P. (1991). The development and integration of behaviour: Essays in honour of Robert Hinde. Cambridge: Cambridge University Press.
4. Borghans et al (2015). Animal models for posttraumatic stress disorder: An overview of what

is used in research. World J Psychiatr December 22; 5(4]: 387396
5. Deacon, R. M. (2006). Housing, husbandry and handling of rodents for behavioral experiments. Nature protocols, 1(2), 936-46. doi: 10.1038/nprot.2006.120.
6. Dawkins, M.S. (1997). Unravelling Animal Behaviour. 2.Ed. Essex: Longman.
7. Eibl-Eibesfeldt I (1975). Ethology: the biology of behavior. 2nd edition. New York: Rinehart and Winston.
8. Ishita Das, Marcel et al. (2019) A multifaceted approach for analyzing complex phenotypic data in rodent models of autism. Das et al. Molecular Autism 10:11
9. Lorenz, K. (1995). Os Fundamentos de Etologia. São Paulo: Editora da UNESP.
10. McFarland, D (1985). Animal Behaviour. Longman Scientific and Technical.
11. Ploger, B. & Yasukawa, K. (2003). Exploring Animal Behavior in Laboratory and Field: An Hypothesis-testing Approach to the Development, Causation, Function, and Evolution of Animal Behavior. San Diego: Academic Press.
12. Ramos A (2008). Animal models of anxiety: do I need multiple tests? Cell press 29:10
13. Simeng et al. (2019) A Model for Basic Emotions Using Observations of Behavior in Drosophila
14. Simon, S., & Nicolelis, M. (2001). Methods of Behavior analysis in Neuroscience. New York.Llc, C R C Press. Front.Psychol.10:781.
15. Slattery et al. (2017) Modelling depression in animals: at the interface of reward and stress pathways. Psychoparmacology 20:10
16. Tinbergen, N. (1951). The Study of Instinct. Clarendon Press, 1989 (first published in 1951).
17. Wishaw, I., & Kolb, B. (2005). The behavior of laboratory rat. New York: Oxford.

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UNIVERSIDADE FEDERAL FLUMINENSE
INSTITUTE OF BIOLOGY
GRADUATE PROGRAM IN NEUROSCIENCES

SUBJECTS DESCRIPTION OF THE GRADUATE COURSE IN NEUROSCIENCES

Name: Membrane Cell Biology and Transport Processes
Code: EGB10001
Professor in Charge: Roberto Paes de Carvalho
Assistants:
Credit hours: 60
Credits: 2

Level:
Master X
Doctorate X

Subject Description:

Plasma membrane structure; historical aspects of the development of membrane models; physical-chemical analysis and thermodynamic aspects of the membrane structure; movements of lipids and proteins; transport across the plasma membrane; passive and active transport; carriers and channels; regulation of transporters; membrane specializations (Lipid rafts and caveolas)

Bibliography:

Basic textbooks recommended.
1. Molecular Biology of the Cell. Bruce Alberts et al., 2016. Sixth edition. Editora: Garland Publishing; ISBN-13: 978-0815344322

2. Molecular Biology of the Gene. Watson et al, 2014. 7a Ed, Pearson.
3. Basic Neurochemistry: Principles of Molecular, Cellular, and Medical Neurobiology. Siegel, Agranoff, Albers, Molinoff. 2011. 8a Edição.
Academic Press

Review articles and articles from recent results will be chosen annually

Paula Campello Costa Lopes

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UNIVERSIDADE FEDERAL FLUMINENSE
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GRADUATE PROGRAM IN NEUROSCIENCES

SUBJECTS DESCRIPTION OF THE GRADUATE COURSE IN NEUROSCIENCES

Name: Cytokines and Nervous System Development Code: EGB10007
Professor in Charge: Elizabeth Giestal de Araújo
Assistants:
Credit Hours: 60
Credits: 2

Level:
Master X
Doctorate X

Subject Description:
Definition of cytokines. Characterization of the families of molecules that compose the cytokine super family. Cytokine signaling mechanisms, involved receptors and signaling pathways. Action of pro and anti-inflammatory interleukins on the nervous system. Global aspect. Effect of IL-2, IL-6 and IL-4 on the development of the nervous system. Synergistic and antagonistic effects of interleukins on the nervous system.

Bibliography:

CLASSIC AND RECENT ARTICLES WILL BE DISCUSSED WITH THE STUDENTS.
1. Cytokines and CNS Development - Benjamin E. Deverman and Paul H. Patterson. Neuron 64, October 15, 2009
2. Microglia Function in the Central Nervous System During Health and Neurodegeneration - Marco Colonna and Oleg Butovsky. Annu. Rev. Immunol. 2017. 35:441-68

3. The role of inflammatory cytokines as key modulators of neurogenesis - Alessandra Borsini, Patricia A. Zunszain, Sandrine Thuret, and Carmine M. Pariante
Trends in Neurosciences March 2015, Vol. 38, No. 3
4. Learning and memory . . . and the immune system - Ioana Marin and Jonathan Kipnis. 20:601-606 # 2013, Published by Cold Spring Harbor Laboratory Press ISSN 1549-5485/13; www.learnmem.org 601 Learning & Memory
5. The Impact of Systemic Inflammation on Neurodevelopment - Nona M. Jiang, Maureen Cowan, Shannon N. Moonah, and WilliamA.PetriJr,. Trends in Molecular Medicine, September 2018, Vol. 24, No. 9
6. Maternal immune activation, central nervous system development and behavioral phenotypes - Elena Minakova | Barbara B. Warner. Birth Defects Research. 2018;110:1539-1550.
7. Physiological functions of the cholinergic system in immune cells. Takeshi Fujii, Masato Mashimo, Yasuhiro Moriwaki, Hidemi Misawa, Shiro Ono, Kazuhide Horiguchi, Koichiro Kawashima. Journal of Pharmacological Sciences 134 (2017) 1e21
8. Immunoadolescence: Neuroimmune development and adolescent behavior Heather C. Brenhousea, and Jaclyn M. Schwarzb
Neuroscience and Biobehavioral Reviews 70 (2016) 288-299
This bibliography will be updated every year. There will be an aspect of biographical survey carried out by students at each course.

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MASTER AND DOCTORATE

UNIVERSIDADE FEDERAL FLUMINENSE
INSTITUTE OF BIOLOGY
GRADUATE PROGRAM IN NEUROSCIENCES

SUBJECTS DESCRIPTION OF THE GRADUATE COURSE IN NEUROSCIENCES

Name: Drug X Receptor Interactions
Code: EGB10192
Professor in Charge: Marcelo Cossenza Pettezonni de Almeida
Assistants:
Credit Hours: 60
Credits: 2
Level:
Master X
Doctorate X

Subject Description:
The course is designed to explore the key concepts of interactions between binding molecules in biological receptors (enzymes, receptors, transporters, ion channels, etc.] and what aspects they relate to the quality and quantity of effect induced by the bond. Quantitative occupancy relationships ("binding") in biological sites (Bmax, Kd), types of effect produced (efficacy) by drug binding (total, partial and inverse agonism), definition of intrinsic activity and intrinsic effectiveness will be studied, quantitative aspects of potency of effects (EC50), study of competitive antagonism (displacement tests and inhibitory power, IC50), non-competitive and irreversible. In the competitive antagonism test, the quantitative relationship of affinity and concentration between agonists and antagonists (Cheng-Prussof equation) will be discussed. The impact of knowledge of these interactive properties between Concentration vs. Affinity, and the desired impact of selectivity for pharmacodynamic effects will also be discussed.

Bibliography:
Textbooks

1. Farmacologia básica e clínica (Portuguese). Bertram G. Katzung e cols. Editora: AMGH; Edição: 13 (2017). ISBN-13: 978-8580555967
2. Bases Farmacológicas da Terapêutica de Goodman e Gilman. Edição: 13 (17 de dezembro de 2018). ISBN-13: 978-8580556148

Review articles and current articles will be distributed annually for discussion and presentation of seminars

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NEUROSCIENCE
MASTER AND DOCTORATE

UNIVERSIDADE FEDERAL FLUMINENSE
INSTITUTE OF BIOLOGY
GRADUATE PROGRAM IN NEUROSCIENCES

SUBJECTS DESCRIPTION OF THE GRADUATE COURSE IN NEUROSCIENCES

Name: Neurobiology of Cognitive processes
Code: EGB10011
Professor in Charge: Luiz Gonzaga Gawryszewski
Credit Hours: 90
Credits: 3
Level:
Master X
Doctorate X

Subject Description:
Models of information processing by the human brain. Elementary mental operations. Mental timing. Information representation modes: visual, phonetic and semantic coding. Information processing modes: Automatic vs. controlled processes. Optative visual attention as a model of cognitive process. Neural mechanisms of eye visual support. The use of PET to locate the cognitive functions of the human brain. Attention, language and awareness.

Bibliography:
Basic textbooks

1. Principles of Neural Science (Princípios da Neurociência). Textbook by Eric Kandel, James H. Schwartz, and Thomas Jessell. 2014.
2. Basic Neurochemistry. 8th Edition. Principles of Molecular, Cellular, and Medical Neurobiology. Editors: Scott Brady George Siegel R. Wayne Albers Donald Price. Editor-in-

Chiefs: Scott Brady. 2011.

Specific articles on the themes proposed each year, based on the specific interest of students enrolled, providing greater emphasis to those of higher demand, observing the curriculum.

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GRADUATE PROGRAM IN NEUROSCIENCES

SUBJECTS DESCRIPTION OF THE GRADUATE COURSE IN NEUROSCIENCES

Name: Chemical Signaling
Code: EGB10003
Professor in Charge: Ana Lucia Marques Ventura
Assistants:
Credit Hours: 60
Credits: 2

Level:
Master X
Doctorate X

Subject Description:
General types of signaling; Hydrophobic mediators and their mechanism of action; Structure and physiology of ionotropic receptors; Structure of metabotropic receptors; Protein G cycle; Effector proteins: adenyl cyclase and phospholipase C; second messengers: cyclic AMP, inositol triphosphate and calcium; Second messenger-dependent protein kinases: PKA and PKC; Trophic factors; Structure and mechanisms of activation of tyrosine kinase receptors; soluble tyrosine kinases; Ras protein and extracellular signal dependent protein kinases (ERKs); regulation of G protein-coupled receptors: desensitization, sequestration and down-regulation; Cell nucleus signaling; Development signaling: Notch, Hedgehog and Wnt; Cytoskeleton signaling;

Bibliography:
Textbooks

1. Principles of Neural Science - Kandel et al., 2014. Fifth Edition. ISBN-13: 978-0071390118
2. Molecular Biology of the Cell. Bruce Alberts et al., 2014. Sixth edition. Editora: Garland Publishing; ISBN-13: 978-0815344322
3. Basic Neurochemistry: Principles of Molecular, Cellular, and Medical Neurobiology (English Edition). Scott & Siegel. 2011 Editora: Academic Press. 8th Edição. ISBN-13: 978-0123749475
4. Princípios de Bioquímica de Lehninger 2017. Nelson et al., 7a Edição. Artmed.ISBN-13: 978-8582715338
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