

## ECE/CS 8570 Neural Dynamics and Communication

**Course Description:** Properties of nerve cells including membrane potential, action potential, ion channel dynamics, GHK equation, dynamical properties of excitable membranes, neuronal communication and plasticity. Entrainment, synchronization and oscillations in neuronal networks, and their functional significance. Graded on A-F basis only.

**Prerequisites:** ECE/CS 4590 or consent of instructor

**Instructor:** Satish S. Nair, 229 EBW (882-2964; [nairs@missouri.edu](mailto:nairs@missouri.edu))

**Credits/ Class hours:** 3 credits; Mon, Thurs 4-5:15 pm, EBW 144

**Text:** *An Introduction to Modeling Neuronal Dynamics* by Christoph Borgers, Springer International Publishing, 2017 + Notes hosted at website, including documents related to the open source software modeling packages NEURON, python and Brain Modeling Tool Kit (BMTK)

**References:** *Dynamical Systems in Neuroscience: The Geometry of Excitability and Bursting* by Eugene M. Izhikevich, The MIT Press, 2007, and

*Theoretical Neuroscience- Computational and Mathematical Modeling of Neural Systems* by Dayan and Abbott, 2005 MIT Press. <http://neurotheory.columbia.edu/~larry/book/>

<b>Grading:</b>	Homeworks	20%
	Two Quizzes	10%
	One Mid-Term Exam	30%
	Final Exam	40%

**Letter grades:** A-F (curve grading)

**Academic dishonesty:** Academic honesty is fundamental to the activities and principles of a University. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards academic dishonesty as an extremely serious matter, with consequences that range from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, or collaboration, consult the course instructor. If you are caught cheating on an exam or assignment, you will either receive a grade of zero for the exam/assignment, or an F for the course. Weekly assignments are individual assignments, so do not copy someone else's assignment.

If you are caught committing academic dishonesty, your actions will be reported to the Provost's office, according to university policy.

**Special needs:** If you need accommodations because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform an instructor immediately. Please see an instructor privately after class, or during office hours. To request academic accommodations (e.g. a note-taker) students must register with Disability Services, AO38 Brady Commons, 882-4696. It is the campus office responsibility to review documentation provided by students requesting academic accommodations, and for accommodations planning in cooperation with students and instructors, as needed and consistent with course requirements. For other MU resources for students with disabilities, click on "Disability Resources" on the MU homepage.