MA665:	**Introduction to Modeling and Data Analysis in Neuroscience (Fall 2024)**	
Instructor:	Mark Kramer (mak@bu.edu)	
Course Hours:	September 3 – October 17, 2024**,** Tue & Thur, 12:30-1:45 PM, CAS B25B	
Office Hours:	Thursdays 3-4 PM, Fridays 12-1:30 PM, MCS 441	
Textbook:	None	
Course Website:	https://mark-kramer.github.io/BU-MA665-MA666/	
Prerequisites:	Graduate standing or consent of instructor.	

This course is intended to introduce neuroscience graduate students to mathematical and statistical concepts in neuroscience. We will focus on developing different types of models: mathematical, biological, artificial, and statistical. We will introduce techniques in scientific computing.

Course goals: To introduce different modeling concepts encountered in neuroscience research and more advanced neuroscience graduate courses. To teach basic programming skills. To think about neuroscience questions in quantitative ways.

Course requirements: The main requirement in this course is <u>effort</u>. I expect your full effort during our course meetings, and outside of the course, to meet the course objectives. As part of this course, you may work together in teams, but must submit your own solutions to all assignments.

Grades: To earn an A, complete all assignments, and participate in class. Effort towards understanding and solving each problem is more important than reporting a correct solution.

Schedule: We will cover 6 topics. Each topic will consist of lectures and hands-on exercises in Python.

Topic 1	Sept 3, 5	**Introduction** (Programming Proficiency)
Topic 2	Sept 10, 17	**Integrate & Fire Neuron**
	No class Sept 12	
Topic 3	Sept 19, 24	**Hodgkin-Huxley Neuron**
Topic 4	Sept 26, Oct 1	**Perceptron**
Topic 5	Oct 3, 8	**Backpropagation**
Topic 6	Oct 10, 17	**Regression**

MA666:	**Advanced Modeling and Data Analysis in Neuroscience (Fall 2024)**
Instructor:	Mark Kramer (mak@math.bu.edu)
Course Hours:	October 22 – December 10, 2024, Tue & Thur, 12:30-1:45 PM, CAS B25B
Office Hours:	Thursdays 3-4 PM, Fridays 12-1:30 PM, MCS 441
Textbook:	None
Course Website:	https://mark-kramer.github.io/BU-MA665-MA666/
Prerequisites:	Graduate standing or consent of instructor.

Course goals: The goal of this course is further study of topics in computational neuroscience, with a focus on rhythmic brain activity. We will focus our analysis and modeling efforts on understanding brain rhythms. You are encouraged to continue working collaboratively with your peers.

Course requirements: The main requirement in this course is effort. I expect your full effort during our course meetings, and outside of the course, to meet the course objectives. As part of this course, you may work together in teams, but must submit your own solutions to all assignments.

Grades: To earn an A, complete all assignments and participate in class. Effort towards understanding and solving each problem is more important than reporting a correct solution.

Schedule: We will cover 6 topics. Each topic will consist of lectures and hands-on exercises in Python.

Topic 7	Oct 22,24	**Introduction to Rhythms**
Topic 8	Oct 29,31, Nov 5	**Analyzing Rhythms** (spectra of fields & spikes)
Topic 9	Nov 7,12,14	**Analyzing Coupled Rhythms** (coherence & CFC)
Topic 10	Nov 19,21	**Gamma Rhythm** (ING, PING, sparse PING)
Topic 11	Nov 26, Dec 3	**Beta Rhythm** (funky currents & bursting)
Topic 12	Dec 5,10	**Not a Rhythm** (aperiodic exponent)