MA665:	**Introduction to Modeling and Data Analysis in Neuroscience (Fall 2025)**
Instructor:	Mark Kramer (mak@bu.edu)
Teaching Fellow:	Brittany Ahn (bahn@bu.edu)
Course Hours:	September 2 – October 17, 2024**,** Tue & Thur, 12:30-1:45 PM, IEC B10
Office Hours:	Thursdays 2:30-3:30 PM, Fridays 12-1 PM, CDS 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 develop the skills to think about neuroscience questions in quantitative ways.

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.

Discussions: Each week you will have the opportunity to attend a discussion section. At the discussion section, you may ask the Teaching Fellow questions about the course material and get help completing your assignments. You may also complete a quiz for extra credit each week.

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. Completing extra credit demonstrates clear effort.

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

Topic 1	Sept 2, 4	**Introduction** (Programming Proficiency)
Topic 2	Sept 9, 10	**Integrate & Fire Neuron**
Topic 3	Sept 16, 18	**Hodgkin-Huxley Neuron**
Topic 4	Sept 23, 25	**Perceptron**
Topic 5	Sept 30, Oct 2	**Backpropagation**
	Oct 7	**Guest Speaker** (from Comp-Neuro to Industry)
Topic 6	Oct 9,16	**Regression**

MA666:	**Advanced Modeling and Data Analysis in Neuroscience (Fall 2025)**
Instructor:	Mark Kramer (mak@bu.edu)
Teaching Fellow:	Brittany Ahn (bahn@bu.edu)
Course Hours:	October 20 – December 10, 2024**,** Tue & Thur, 12:30-1:45 PM, PSY 212
Office Hours:	Thursdays 2:30-3:30 PM, Fridays 12-1 PM, CDS 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.

Discussions: Each week you will have the opportunity to attend a discussion section. At the discussion section, you may ask the Teaching Fellow questions about the course material and get help completing your assignments. You may also complete a quiz for extra credit each week.

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. Completing extra credit demonstrates clear effort.

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

Topic 7	Oct 21, 23	**Introduction to Rhythms**
Topic 8	Oct 28, 30	**Analyzing Rhythms** (spectra of fields & spikes)
Topic 9	Nov 4, 6, 11	**Analyzing Coupled Rhythms** (coherence & CFC)
Topic 10	Nov 13, 18	**Gamma Rhythm** (ING, PING, sparse PING)
Topic 11	Nov 20, 25	**Beta Rhythm** (funky currents & bursting)
Topic 12	Dec 2, 4	**Not a Rhythm** (aperiodic exponent)
	Dec 9	(No class due to AES Annual Meeting)