Youngmin Park, Ph.D.
Department of Mathematics
Brandeis University
415 South Street
Goldsmith 218, Mailstop 050
Waltham, MA 02453
October 22, 2020

Search Committee
USC - DEPT. OF MATH
3620 S. VERMONT AVE.- KAP 104
LOS ANGELES, CA 90089-2532

Dear Members of the Search Committee,

I am applying for the position of Assistant Professor in Mathematics at USC. I hold a Ph.D. in mathematics from the University of Pittsburgh advised by G. Bard Ermentrout, and now hold a postdoctoral position at Brandeis University advised by Thomas G. Fai. **I specialize in dynamical systems and bifurcation theory**, with a focus on neuroscience and cell physiology.

My doctoral research in dimension reduction resulted in winning the prestigious **Andrew Mellon Predoctoral Fellowship**, awarded to doctoral students of exceptional promise and ability. I was the first math-bio doctoral student at the University of Pittsburgh to receive this award. My research ability has matured through my postdocs. At the University of Pennsylvania, I collaborated closely with neuroscientists and published ground-breaking models to explain data produced by the world's leading auditory labs. At Brandeis, I have continued to develop my abilities as an independent mathematician while publishing in multiple fields, including coupled oscillators and molecular motor dynamics. Much of my recent work is collaborative but largely independent.

USC features top researchers who include natural science in their work including **Chunming Wang** and **Robert Sacker**, but representation in neuroscience is less salient. My skill set will augment their work through collaborations, and complement their work through independent research. I offer a decade's worth of experience in solving problems of oscillator synchrony using dynamical systems and bifurcation theory, and firmly believe that my presence will bolster USC's reputation in applied mathematics.

I am also committed to providing high-quality and equal education for all my students, as evidenced by my teaching evaluations. My teaching portfolio boasts eight years of teaching at different capacities (lectures, recitations, grading), at different levels (calculus sequence, differential equations, linear algebra, and discrete math), and at different institutions (Oberlin College, Case Western Reserve University, University of Pittsburgh, and Brandeis University). As a doctoral student, my students shortlisted me for the **Elizabeth Baranger teaching award**, the most prestigious teaching award at the University of Pittsburgh. I have also served as a guest lecturer for underprivileged Bangladeshi children at the Free Library of Philadelphia.

I strongly believe in the principle that learning is best accomplished with context and practice. My students do not learn in a vacuum, but instead learn concepts alongside the human triumph and defeat behind many concepts we take for granted today, such as matrix notation and Euclid's fifth postulate. Students at USC will greatly benefit from this approach, and in turn, will drive me towards excellent instruction.

As part of my application I include a curriculum vitae, teaching statement, and research statement. Please request additional details as needed, and I look forward to our correspondence.

Sincerely,

Youngmin Park, Ph.D., Postdoctoral Fellow

Youngmin Park

Last updated: October 19, 2020

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Employment

June 2019 – Present	Postdoctoral Fellow **Brandeis University** Advisor: Thomas Fai
May 2018 – May 2019	Postdoctoral Fellow **University of Pennsylvania** Advisor: Maria N. Geffen

Education

Aug. 2013 – Apr. 2018	PhD Mathematics, **University of Pittsburgh** Thesis: Dimension Reduction of Neural Models Across Multiple Spatio-temporal Scales | Advisor: G. Bard Ermentrout
Aug. 2012 – Aug. 2013	MS Applied Math **Case Western**, Cleveland, OH Thesis: Infinitesimal Phase Response Curves for Piecewise Smooth Dynamical Systems | Advisor: Peter J. Thomas
Aug. 2008 – Aug. 2013	BS Applied Math **Case Western**, Cleveland, OH

Additional Training

Sep. 2016	Max Planck Institute Göttingen Advanced Computational Neuroscience
Aug. 2015	Woods Hole MBL Methods in Computational Neuroscience
Jun. 2010	Mathematical Biosciences Institute OSU Summer Program

Peer-Reviewed Publications

1. **Park, Y.**, Fai, T.G. "The Dynamics of Vesicles Driven Into Closed Constrictions by Molecular Motors" (In press, Bulletin of Mathematical Biology).
2. **Park, Y.**, Geffen, M.N.,"A Circuit Model of Auditory Cortex." PLOS Computational Biology. 17.6:e1008016 (2020).
3. Ermentrout, G.B., **Park, Y.**, Wilson, D.,"Recent advances in coupled oscillator theory." Philosophical Transactions A. 377. (2019).
4. **Park, Y.**, Ermentrout, G.B. "A Multiple Timescales Approach to Bridging Spiking- and Population-level Dynamics." Chaos. 28.8:083123 (2018).
5. **Park, Y.**, Ermentrout, G.B. "Scalar Reduction of a Neural Field Model with Spike Frequency Adaptation." SIADS 17.1:931–981 (2018).
6. **Park, Y.**, Shaw, K.M. Chiel, H.J. Thomas, P.J. "The Infinitesimal Phase Response Curve of Oscillators in Piecewise Smooth Dynamical Systems." EJAM 19.5:905–940 (2018).
7. **Park, Y.**, Ermentrout, G.B. "Weakly Coupled Oscillators in a Slowly Varying World." Springer Journal of Computational Neuroscience 40.3:269–281 (2016).
8. Shaw, K.M., **Park, Y-M.**, Chiel, H.J., Thomas, P.J. "Phase Resetting in an Asymptotically Phaseless System: On the Phase Response of Limit Cycles Verging on a Heteroclinic Orbit." SIADS 11.1:350–91 (2012).

Recently Submitted:

1. Fai, T.G., **Park, Y.** "Global asymptotic stability of an active disassembly model of flagellar length control" (Submitted, Journal of Theoretical Biology. `https://arxiv.org/abs/2010.08163`).
2. **Park, Y.**, Wilson, D. "High-Order Accuracy Computation of Coupling Functions for Strongly Coupled Oscillators" (Submitted, SIADS. `https://arxiv.org/abs/2010.01194`).

Book Chapters

1. **Park, Y.**, Heitmann, S., Ermentrout, G.B. "The Utility of Phase Models in Studying Neural Synchronization." Book chapter in "Computational Models of Brain and Behavior". Wiley-Blackwell 493–505 (2017).

Presentations

- "Scalar Reduction of a Neural Field Model with Spike Frequency Adaptation"
  - Mar. 2020 Boston University Dynamics Seminar (Cancelled due to COVID-19)
  - Jul. 2019 Society for Mathematical Biology, University of Montreal
  - May 2019 SIAM Dynamical Systems, Snowbird, Utah
  - Mar. 2016/17 U of Pitt Mathematical Biology Seminar
- "A Multiple Timescales Approach to Bridging Spiking- and Population-level Dynamics"
  - Mar. 2018 U of Pitt Mathematical Biology Seminar
- "The Dynamics of Vesicles Driven through Closed Constrictions by Molecular Motors"
  - Aug. 2020 Society for Mathematical Biology, Zoom
  - Jun. 2020 SIAM Life Sciences, Zoom
  - Jun. 2020 Brandeis Mathematical Biology Seminar
  - Jan. 2020 Aspen Center for Physics, Aspen, CO
  - Nov. 2019 APS Fluids, Seattle, WA
  - Aug. 2019 Society for Mathematical Biology, Zoom
- "Weakly Coupled Oscillators in a Slowly Varying World"
  - Sep. 2018 Computational Neuroscience Initiative Seminar, Philadelphia, PA
  - May 2015/17 SIAM Dynamical Systems, Snowbird, Utah
  - Mar. 2015 U of Pittsburgh Mathematical Biology Seminar
- "The Infinitesimal Phase Response Curve of Oscillators in Piecewise Smooth Dynamical Systems"
  - Jul. 2017 SIAM Annual Meeting, Pittsburgh, PA

Honors and Awards

Sep. 2017–May 2018	Andrew Mellon Predoctoral Fellowship
2017	SIAM Student Travel Award
2016	Elizabeth Baranger Teaching Award (nominated)
2012	SPUR (Summer Program for Undergraduate Research)

Teaching

School	Type	Class	Term(s)
Brandeis (2019–2021)	Lecture	Linear Algebra	Spring 2020
U of Pitt. (2013–18)	Lecture	Differential Equations (3 sections)	Summers, 2014–2017
		Linear Algebra	Summer 2015
		Discrete Math	Spring 2015
	Recitation	Computational Neuroscience	Summers, 2014–2017
		Business Calculus (6 sections)	Fall/Spring 2013/16
		Calculus 1, 2, 3 (6 sections)	Fall/Spring 2014–2016
	Grading	Differential Equations (10 sections)	Fall/Spring 2013–2017
		Complex Variables and Applications	Spring 2017
		Linear Algebra (2 sections)	Spring 2016
Oberlin (2013)	Assistant	Computational Neuroscience	Winter 2013

Service

Jun. 2019–Jul. 2020	Organizer for the Brandeis Math Bio Seminar
Jul. 2019–Pres.	Volunteer member of the SMB Neuroscience Subgroup Board of Directors
Jul. 2019	Judge for poster presentations at SMB 2019 Montreal
Apr. 2019	Guest lecturer, Science Outreach, Moder Patshala & Free Library of Philadelphia.
Jul. 2017	Volunteer kit-stuffing at the SIAM Annual Meeting
Mar. 2017	Volunteer lifeline at the Pitt Integration Bee

Conferences and Posters

Mar. 2019	Poster, MINS Symposium Philadelphia, Pennsylvania
Sep. 2018	Poster, Auditory SPLASH Conference Philadelphia, Pennsylvania
May. 2015	Poster, SIAM: Dynamical Systems Snowbird, Utah
May. 2011	Attendance, SIAM: Dynamical Systems, Snowbird, Utah
Aug. 2010	Oral presentation, Mathematical Association of America MathFest, Pittsburgh, PA
Jul. 2010	Attendance, SIAM: Life Sciences, Pittsburgh, PA

Teaching Statement

Youngmin Park

1 Teaching Philosophy

I teach based on the principle that practice and context drive robust learning. In practice, I do not use a single teaching style, but draw elements from expeditionary learning, inquiry-based learning, and flipped classrooms, direct instruction, and differentiated instruction. My flexibility allows me to best address the needs of different classrooms and individual students. I implement these methods in the following ways:

1. **Expeditionary learning** is implemented in the form of student presentations, typically with more experienced undergraduates, in classes like linear algebra and differential equations. Students are encouraged to pick from a list of topics or formulate their own topic. For example, my Summer 2016 class was given the list:

   - Write a program to reproduce the bifurcation diagram of the logistic map.
   - Write a program to reproduce the Fourier series of classic functions: square wave, sawtooth. Demonstrate improved accuracy with more Fourier terms.
   - Write a program for Forward Euler, 2nd order Runge-Kutta, and 4th order Runge-Kutta. Compare accuracy .
   - Series solutions of differential equations: discuss several examples of this solution method.
   - The method of Lyapunov. Present the theorem and show examples of the method.
   - Matrix exponentials. Show how to solve linear ODEs using matrix exponentials.

   While I provide close guidance in preparing the presentation and research, students are given great independence in exploring the depth and breadth of their topic. This approach includes elements of **personalized teaching**, where students are allowed to master topics at their own pace, and are given additional guidance as needed. My students not only enjoyed this process, but found that it helped them understand detailed and big-picture concepts.

2. **Inquiry-based Learning** is implemented in every lecture by encouraging both myself and my students to ask questions about the work. Why is it important to know derivatives? What is the use of the matrix null space? This process of questioning has led me to become a better teacher by helping students understand why and how some concepts were introduced. For example, based on my students' questions, I felt that my explanation of nullspace was insufficient, learning me to write a Python script demonstrating how matrices deform shapes. The visualization better explained the concepts of nullspace, range, and linear transformations. As another example, also based on my students' questions, I explained how matrix notation took the better part of a mathematician's career to standardize, and the notation is relatively young compared to the millennia-long history of linear equations. Through inquiry-based learning, my students have a voice in how they learn.

3. **Flipped classrooms** are implemented on days dedicated to problem-solving. Near the beginning of the semester, these problems are straightforward applications of formulas, definitions, and theorems, which are crucial for a baseline understanding of advanced concepts. This stage often appears as **direct instruction**. Students are assigned a series of reading sections or problems prior to class, so they are prepared to learn how to solve

problems. As the semester progresses, I introduce increasingly challenging problems that push the students to connect multiple concepts, and perhaps, to generate their own. To assist in problem-solving, I assign students to work in pairs and encourage discussion, which leads to a mutually beneficial give-and-take: as the students encounter difficulties, they often overcome them autonomously while teaching each other in their own words. If they are unable to overcome a hurdle, they ask for help, which makes me understand the specific challenges faced by my students. Through this process I tailor my teaching to adjust to individual students.

4. **Differentiated instruction** is implemented at all times. While my default teaching style is geared towards a broad spectrum of abilities, it is not always the case that students will excel in a classroom environment. In fact, I was a student who struggled in classroom environments despite being able to learn in other contexts. Therefore, I am sensitive to students who struggle and especially those who seek help during office hours. I have found that these one-on-one meetings are excellent for tailoring my teaching to the individual in a way that would not be possible in a lecture. For example, I had a student struggle to understand basic proof concepts while establishing an upper bound using the triangle inequality. Explaining the concepts took substantial time and effort, but the student ultimately excelled in the course. I do not hesitate to help my students in these moments.

To conclude, I remark that my teaching efforts are always **independent of a student's race, gender, or socio-economic background**. I hope to see a world where every student has access to teachers who genuinely want their students learn and succeed, based on the tenets of **diversity, equity, and inclusion**. To this end I have taught as a guest lecturer in science for underrepresented Bangladeshi children at Moder Patshala and the Free Library of Pennsylvania. At Brandeis, I volunteered in science outreach to give neuroscience lectures at Waltham High School (the event was canceled due to COVID-19). In the future, I will continue to seek opportunities in science outreach and join organizations advocating for underrepresented groups, including the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), and the Association for Women in Mathematics (AWM). **All people deserve the best from their teachers and I will not stop working to make this hope a reality**.

2 Teaching Experience

Type	*Class*	*Term(s)*
Brandeis (2019-2021)		
Lecture	Linear Algebra	Spring 2020
University of Pittsburgh (2013-2018)		
Lecture	Differential Equations (3 sections)	Summers, 2014–2017
	Linear Algebra	Summer 2015
	Discrete Math	Spring 2015
Recitation	Computational Neuroscience	Summers, 2014–2017
	Business Calculus (6 sections)	Fall/Spring 2013/16
	Calculus 1, 2, 3 (6 sections)	Fall/Spring 2014–2016
Grading	Differential Equations (10 sections)	Fall/Spring 2013–2017
	Complex Variables and Applications	Spring 2017
	Linear Algebra (2 sections)	Spring 2016
Oberlin (2013)		
Assistant	Computational Neuroscience	Winter 2013
Case Western Reserve University (2012)		
Assistant	Calculus 3	Spring 2012

My teaching experience spans eight years at three institutions. My teaching style has consistently led to strong teaching evaluations and a shortlist for the Elizabeth Baranger teaching award, which serves to recognize and reward outstanding teaching by graduate students at the University of Pittsburgh.

I independently designed each course and prepared all materials including lectures, quizzes, tests, and homework assignments when serving as a lecturer, where I taught classes of varying sizes, ranging from 9 to 50 students. My teaching duties included meeting students during office hours and making additional appointments as needed. As a course assistant, grader, or recitation leader, I coordinated with the instructor to best evaluate students through quizzes and homework assignments. At the University of Pittsburgh, I became closely acquainted with Lon Capa while teaching numerous courses in the calculus sequence. All recitations were supplemented by office hours and additional appointments as needed.

University of Pittsburgh
Office of Measurement and Evaluation of Teaching

Dear Professor Youngmin Park:

Student Opinion of Teaching Questionnaire Results

This form contains evaluation results for ANALYTC GEOMETRY & CALCULUS 1(MATH-0220)-1215.

Attached is a report in PDF format containing your Student Opinion of Teaching Survey results from last term. The report is best viewed and/or printed in color.

The evaluation results are broken down into three distinct categories. The first part of the report shows a breakdown of student responses to the quantitative questions. For each item, the number of students (n) who responded, the average or mean (av.) and standard deviation (dev.) are displayed next to a chart or histogram that shows the percentage of the class who responded to each option for that question. The percentages are above the number on the rating scale which increases from left to right, i.e. the number 1 equals the least favorable rating and the number 4 or 5 (depending on the scale) equals the most favorable rating. The sum of percentages will equal 100%. A red mark is displayed on the chart where the average or mean is located. To calculate how many students responded to each option, multiply the number of students who answered the question by the percentage for that option. For example, if 14 students answered the question and 50% responded to option 3 then 7 students marked option 3 for that item (14 x .50 = 7). The standard deviation is a common measure of dispersion around the mean that may be useful in interpreting the results.

If your school had previously calculated norms, they will be on OMET's website (omet.pitt.edu).

The second part displays individual comments to each question in the open-ended section of the evaluation. All the responses to the first question will be listed together after the first question and then the responses to the next question will be listed together after the next question, and so on.

The final part gives you a profile of the student responses to the quantitative section of the evaluation. This is a chart listing all of the means for the scaled items with a dashed red line connecting the means.

If the number of respondents for any of the scaled items is fewer than seven, please be cautious in interpreting the quantitative results.

Office of Measurement and Evaluation of Teaching (OMET)

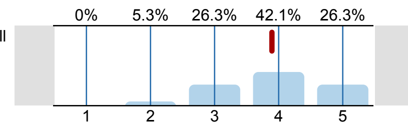
Professor Youngmin Park

ANALYTC GEOMETRY & CALCULUS 1(MATH-0220)-12152151_UPITT_MATH_0220_SEC1215
Fall 2014
19 RESPONDENTS = 76% OF NUMBER REGISTERED

1. SELF RATINGS

1.1) Did the recitations contribute to your learning in this course?

Not at all



To a very high degree

n=19
av.=3.89
dev.=0.88

1.2) What grade do you expect in the course?

n=19

A	31.6%
B	36.8%
C	26.3%
D	5.3%
F	0%
Other	0%
Credit/No Entry	0%
Audit	0%

1.3) What grade do you expect in this recitation?

n=19

A	47.4%
B	31.6%
C	5.3%
D	10.5%
F	0%
Other	0%
Credit/No Entry	0%
Audit	0%
No Grade Given	5.3%

1.4) What percent of the recitations did you attend?

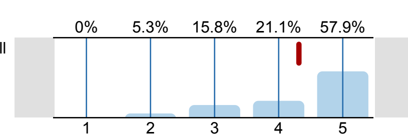
n=19

Less than 25%	0%
26-50%	0%
51-75%	5.3%
76-100%	94.7%

2. COURSE AND RECITATION

2.1) The material covered in recitation is well connected to the lectures.

Hardly at all

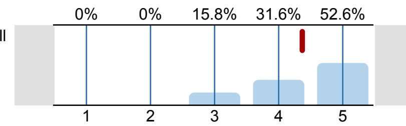


To a very high degree

n=19
av.=4.32
dev.=0.95

3. RECITATION INSTRUCTOR TEACHING EVALUATION

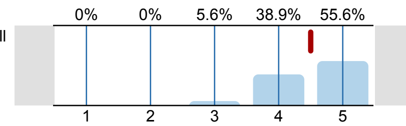
3.1) The recitation instructor was well-prepared for the recitations.

Hardly at all


To a very high degree

n=19
av.=4.37
dev.=0.76

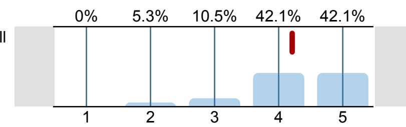
3.2) The recitation instructor appeared knowledgeable about course subject matter.

Hardly at all


To a very high degree

n=18
av.=4.5
dev.=0.62
ab.=1

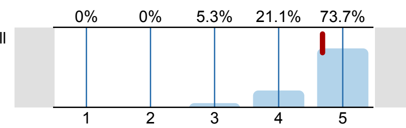
3.3) The recitation instructor clarified material covered in course lectures.

Hardly at all


To a very high degree

n=19
av.=4.21
dev.=0.85

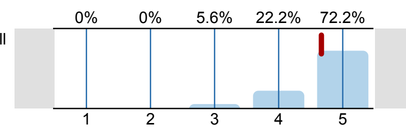
3.4) The recitation instructor showed interest in helping students understand the material.

Hardly at all


To a very high degree

n=19
av.=4.68
dev.=0.58

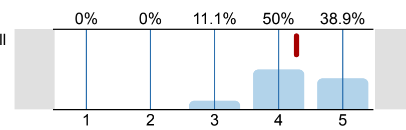
3.5) The recitation instructor returned assignments within a reasonable amount of time.

Hardly at all


To a very high degree

n=18
av.=4.67
dev.=0.59
ab.=1

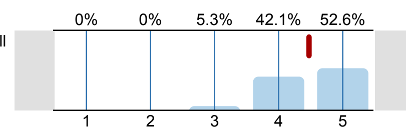
3.6) The recitation instructor was concerned about students' progress in the course.

Hardly at all


To a very high degree

n=18
av.=4.28
dev.=0.67

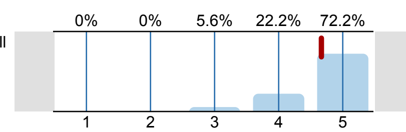
3.7) The recitation instructor provided helpful answers to students' questions.

Hardly at all


To a very high degree

n=19
av.=4.47
dev.=0.61

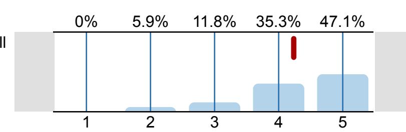
3.8) The recitation instructor treated students with respect.

Hardly at all


To a very high degree

n=18
av.=4.67
dev.=0.59
ab.=1

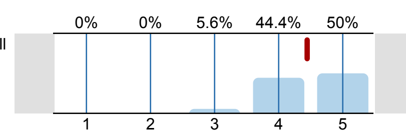
3.9) The recitation instructor provided constructive feedback on assignments.

Hardly at all


To a very high degree

n=17
av.=4.24
dev.=0.9
ab.=2

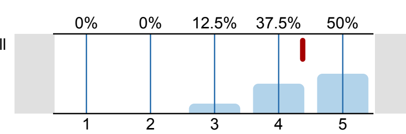
3.10) The recitation instructor maintained an environment in which students felt comfortable asking questions.

Hardly at all


To a very high degree

n=18
av.=4.44
dev.=0.62
ab.=1

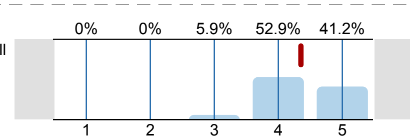
3.11) The recitation instructor was available for help outside of the labs. *Mark (NA) if you did not seek outside help.*

Hardly at all


To a very high degree

n=8
av.=4.38
dev.=0.74
ab.=11

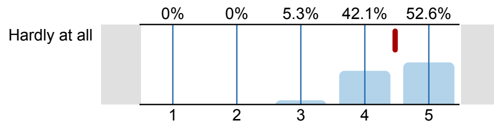
3.12) The recitation instructor communicates effectively.

Hardly at all


To a very high degree

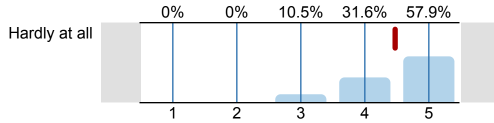
n=17
av.=4.35
dev.=0.61
ab.=2

3.13) The recitation instructor comprehends students' communication.



n=19
av.=4.47
dev.=0.61

3.14) The recitation instructor led this recitation effectively.



n=19
av.=4.47
dev.=0.7

3.15) Would you recommend this recitation instructor to other students who are going to take this course?

No	0%
Probably not	0%
Probably yes	52.6%
Yes	47.4%

n=19

4. RECITATION COMMENTS

4.1) Your recitation instructor would like to know if there is something you believe he/she has done especially well in teaching this recitation section.

- A good point of your teaching style is that when a student asks you for help, you respond succinctly and efficiently. Short, sweet, and to the point, your answers don't take a more roundabout approach like some other instructors', and as such you're able to explain how to do a problem with minimal confusion on the student's part.
- Basically everything. Especially giving harder problems/problems with tricks in them that we didn't go over in lecture as example problems in recitation so we could know how to do the harder problems for the test.
- Explaining example problems and explaining answers well when asked questions. Made me understand and clarify a lot of what I was confused about from the class.
- He definitely knows the material and was able to effectively communicate his knowledge to us by asking us what problems we needed help with and showing us the correct ways to do materials that may have been different than what we learned in the actual class.
- He does a great job with addressing students' concerns in regards to homework problems and difficult concepts.
- His own examples of problems helped clear up some concepts discussed.
- I pretty much always felt prepared for the quizzes did a considerable job of going over similar questions that appeared on the quizzes.
- I think he is very good at answering students questions. When I give him a problem to go over, he immediately does that and it helps me a lot.
- The TA does well in answering any and all questions given to him, though there have been times that the students have had to answer when he gets stuck. I love the fact that he posts quiz answers online, as they are very helpful.
- Thoroughly answered all the questions when asked in the recitations and was helpful every time I went.
- You really helped in translating what we couldn't understand from Lam in lecture and your problems done in class were very helpful for the quizzes and the tests.
- You taught Calc 1 better than my lecture professor.
- interacts with the class well
- knowing the material

4.2) Your recitation instructor would also like to know what specific things you believe might be done to improve the teaching of this recitation section.

- I can't think of anything. He did a great job and was very helpful
- I think he should communicate more with the instructor and prepare book questions to go over in recitation.
- It did not happen often, though he just needs to make sure he just finishes the problem completely. Sometimes (not often) he would stop

near the end of the problem and say, "okay, just simplify from here." Well sometimes I did not know how to simplify so it would be nice if he could have finished.

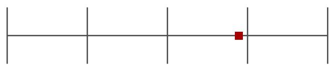
- Nothing I can think of specifically.
- Professor Lam shows us how to solve problems using specific steps designed to make it easier for students to understand Calculus. Professor Park doesnt really use the same steps as Professor Lam when solving problems on the board which makes it very very confusing.
- Some of his teaching styles were different from Lam in the way that the problems were done. Sometimes the teaching was confusing but still highly helpful.
- Sometimes examples that are worked out in class are done with different methods than the instructor and it can confuse the proper technique and how the professor wants the questions answered.
- Sometimes he would approach questions differently than we were taught in lecture or used different notations which was confusing.
- Sometimes not knowing what we were learning in class and therefore teaching ahead of what we knew made the class confusing
- There were a few times when I thought you could have been a little more organized, but it wasn't that big a deal.
- connecting material with the course more. as in going over concepts taught in lecture while going through a problem
- finding solutions the same way the professor does
- talk to the course instructor about materiel so that both teach the same way and do not confuse students

Profile

Subunit: A&S-MATH LOWER LEVEL
Name of the instructor: Professor Youngmin Park,
Name of the course: (Name of the survey) ANALYTC GEOMETRY & CALCULUS 1(MATH-0220)-1215

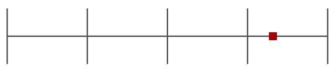
Values used in the profile line: Mean

1. SELF RATINGS



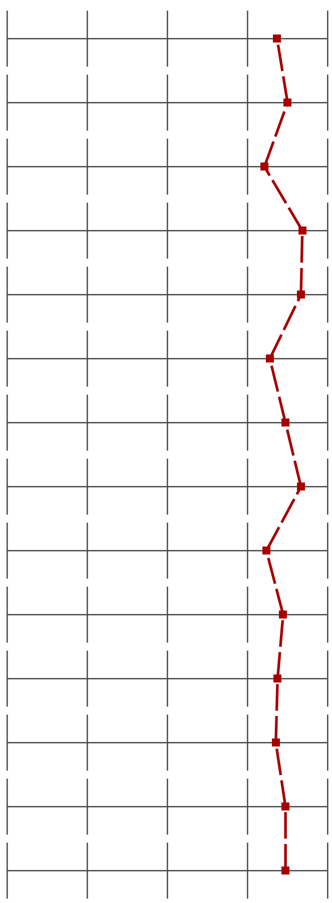
1.1)	Did the recitations contribute to your learning in this course?	Not at all	To a very high degree	n=19	av.=3.89 md=4.00 dev.=0.88

2. COURSE AND RECITATION



2.1)	The material covered in recitation is well connected to the lectures.	Hardly at all	To a very high degree	n=19	av.=4.32 md=5.00 dev.=0.95

3. RECITATION INSTRUCTOR TEACHING EVALUATION



3.1)	The recitation instructor was well-prepared for the recitations.	Hardly at all	To a very high degree	n=19	av.=4.37 md=5.00 dev.=0.76
3.2)	The recitation instructor appeared knowledgeable about course subject matter.	Hardly at all	To a very high degree	n=18	av.=4.50 md=5.00 dev.=0.62
3.3)	The recitation instructor clarified material covered in course lectures.	Hardly at all	To a very high degree	n=19	av.=4.21 md=4.00 dev.=0.85
3.4)	The recitation instructor showed interest in helping students understand the material.	Hardly at all	To a very high degree	n=19	av.=4.68 md=5.00 dev.=0.58
3.5)	The recitation instructor returned assignments within a reasonable amount of time.	Hardly at all	To a very high degree	n=18	av.=4.67 md=5.00 dev.=0.59
3.6)	The recitation instructor was concerned about students' progress in the course.	Hardly at all	To a very high degree	n=18	av.=4.28 md=4.00 dev.=0.67
3.7)	The recitation instructor provided helpful answers to students' questions.	Hardly at all	To a very high degree	n=19	av.=4.47 md=5.00 dev.=0.61
3.8)	The recitation instructor treated students with respect.	Hardly at all	To a very high degree	n=18	av.=4.67 md=5.00 dev.=0.59
3.9)	The recitation instructor provided constructive feedback on assignments.	Hardly at all	To a very high degree	n=17	av.=4.24 md=4.00 dev.=0.90
3.10)	The recitation instructor maintained an environment in which students felt comfortable asking questions.	Hardly at all	To a very high degree	n=18	av.=4.44 md=4.50 dev.=0.62
3.11)	The recitation instructor was available for help outside of the labs. *Mark (NA) if you did not seek outside help.*	Hardly at all	To a very high degree	n=8	av.=4.38 md=4.50 dev.=0.74
3.12)	The recitation instructor communicates effectively.	Hardly at all	To a very high degree	n=17	av.=4.35 md=4.00 dev.=0.61
3.13)	The recitation instructor comprehends students' communication.	Hardly at all	To a very high degree	n=19	av.=4.47 md=5.00 dev.=0.61
3.14)	The recitation instructor led this recitation effectively.	Hardly at all	To a very high degree	n=19	av.=4.47 md=5.00 dev.=0.70

University of Pittsburgh
Office of Measurement and Evaluation of Teaching

Dear Professor Youngmin Park:

Student Opinion of Teaching Questionnaire Results

This form contains evaluation results for INTRO TO MATRICES & LINEAR ALG(MATH-0280)-1020.

Attached is a report in PDF format containing your Student Opinion of Teaching Survey results from last term. The report is best viewed and/or printed in color.

The evaluation results are broken down into three distinct categories. The first part of the report shows a breakdown of student responses to the quantitative questions. For each item, the number of students (n) who responded, the average or mean (av.) and standard deviation (dev.) are displayed next to a chart or histogram that shows the percentage of the class who responded to each option for that question. The percentages are above the number on the rating scale which increases from left to right, i.e. the number 1 equals the least favorable rating and the number 4 or 5 (depending on the scale) equals the most favorable rating. The sum of percentages will equal 100%. A red mark is displayed on the chart where the average or mean is located. To calculate how many students responded to each option, multiply the number of students who answered the question by the percentage for that option. For example, if 14 students answered the question and 50% responded to option 3 then 7 students marked option 3 for that item (14 x .50 = 7). The standard deviation is a common measure of dispersion around the mean that may be useful in interpreting the results.

If your school had previously calculated norms, they will be on OMET's website (omet.pitt.edu).

The second part displays individual comments to each question in the open-ended section of the evaluation. All the responses to the first question will be listed together after the first question and then the responses to the next question will be listed together after the next question, and so on.

The final part gives you a profile of the student responses to the quantitative section of the evaluation. This is a chart listing all of the means for the scaled items with a dashed red line connecting the means.

If the number of respondents for any of the scaled items is fewer than seven, please be cautious in interpreting the quantitative results.

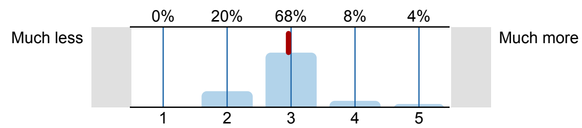
Office of Measurement and Evaluation of Teaching (OMET)

Professor Youngmin Park

INTRO TO MATRICES & LINEAR ALG(MATH-0280)-10202157_UPITT_MATH_0280_SEC1020
2157_12WK
25 RESPONDENTS = 96.15% OF NUMBER REGISTERED

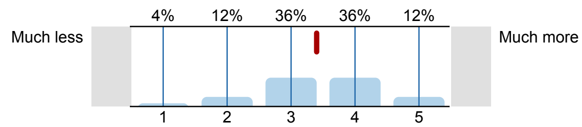
1. SELF RATINGS

1.1) Compared to other courses at the same level, the amount of work I did was:



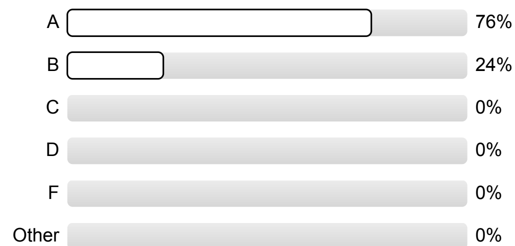
n=25
av.=2.96
dev.=0.68

1.2) In this course I have learned:



n=25
av.=3.4
dev.=1

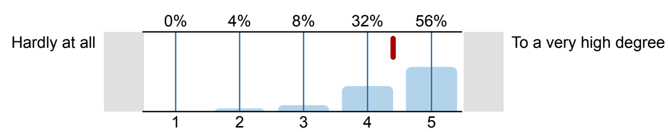
1.3) The grade I expect in this course is:



n=25

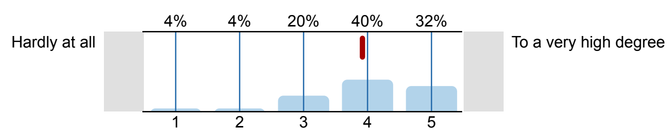
2. TEACHING EVALUATION

2.1) The instructor presented the course in an organized manner.



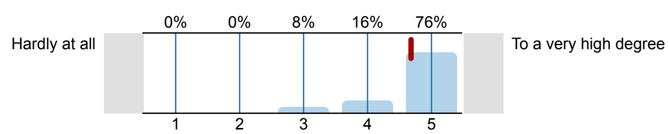
n=25
av.=4.4
dev.=0.82

2.2) The instructor stimulated my thinking.



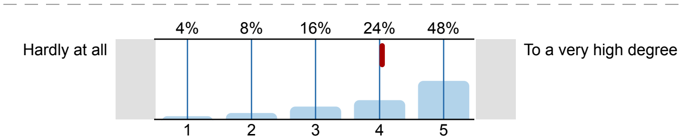
n=25
av.=3.92
dev.=1.04

2.3) The instructor evaluated my work fairly.



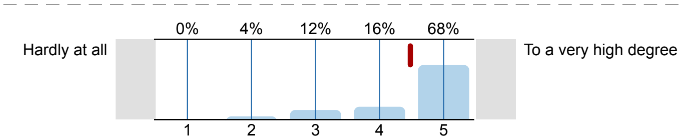
n=25
av.=4.68
dev.=0.63

2.4) The instructor made good use of examples to clarify concepts.



n=25
av.=4.04
dev.=1.17

2.5) The instructor maintained a good learning environment.



n=25
av.=4.48
dev.=0.87

2.6) The instructor was accessible to students. (Do not answer if no basis to judge)

Hardly at all	1	2	3	4	5	To a very high degree	
	0%	0%	4.8%	19%	76.2%		n=21 av.=4.71 dev.=0.56

2.7) Express your judgment of the instructor's **overall teaching effectiveness:**

Ineffective	1	2	3	4	5	Excellent	
	4%	4%	8%	32%	52%		n=25 av.=4.24 dev.=1.05

2.8) Would you recommend this <u>course</u> to other students?

n=25

Definitely not	4%
Probably not	16%
Probably yes	32%
Definitely yes	48%

2.9) Would you recommend this <u>instructor</u> to other students?

n=25

Definitely not	4%
Probably not	8%
Probably yes	16%
Definitely yes	72%

3. MATH TA/TF ADDITIONAL ITEMS

3.1) Did you experience difficulty in comprehending your lecture instructor's spoken language in class?

n=25

No difficulty at all	96%
Small amount of difficulty	4%
Moderate difficulty	0%
Severe difficulty	0%
	0%

3.2) Did your lecture instructor experience difficulty in comprehending the questions that were asked by students in class?

n=25

No difficulty at all	88%
Small amount of difficulty	12%
Moderate difficulty	0%
Severe difficulty	0%

3.3) The lecture instructor's writing on the chalkboard was legible.

n=23

Seldom	4.3%
Sometimes	0%
About half the time	0%
Usually	8.7%
Always	87%

3.4) The lecture instructor's attitude toward the subject was enthusiastic.

n=25

Hardly at all	0%
To a small degree	4%
To a moderate degree	12%
To a considerable degree	16%
To a very high degree	68%

3.5) Compare to most courses I've taken, the lecture instructor treated students with respect.

n=25

Much less	0%
Somewhat less	4%
About the same	24%
Somewhat more	24%
Much more	48%

3.6) The lecture instructor was available for help during his/her office hours.

n=24

Very seldom	0%
Sometimes	0%
Frequently	4.2%
Almost always	66.7%
Cannot judge	29.2%

3.7) The lecture instructor arrived for class on time.

n=25

Rarely (less than 20% of the time)	0%
Seldom (20-40% of the time)	0%
About half the time (40-70% of the time)	0%
Usually (70-90% of the time)	4%
Over 90% of the time	96%

3.8) Lecture instructor provided the opportunity for questions.

n=24

Very seldom	0%
About half the time	0%
Frequently	20.8%
Almost always	75%
Cannot judge	4.2%

3.9) Helpful answers were given to questions raised in class.

n=24

Very seldom	4.2%
About half the time	4.2%
Frequently	4.2%
Almost always	87.5%
Cannot judge	0%

3.10) Would you recommend this lecture instructor to a friend taking this course?

n=25

Not at all	4%
Unlikely	8%
Don't know	0%
Maybe	8%
Definitely	80%

4. TEACHING COMMENTS

4.1) What were the instructor's major strengths?

- Approachable, gives students lots of opportunities to do well
- Being good with students
- Definitely a great teacher. Really enjoys what he's doing.

  Fair grading, simple and clear organization.
  Followed syllabus very well.

  Thank you for a great class. I really enjoyed it.
- Good understanding of the course material and able to answer questions
- He graded quickly, very helpful, nice and very understandable.
- He knew the material so well that when we had questions he was able to explain applications to what we were doing.
- He knew the material well
- He was very passionate about the subject, and seemed to care very much that we learned and did well. Exams were very fair and tested knowledge that he was sure to reinforce in the homeworks, and he was a pleasant person with a generally good demeanor.
- Knew the course material well. Was able to answer questions in a helpful and explicit manner.
- Not exactly sure
- Obviously very knowledgeable about the course material, and genuinely enthusiastic about most concepts. Struck a perfect balance between the "cool" professor who could joke around with students and connect with us more as peers than as students, and the respected professor who you wouldn't even think of trying to take advantage of (arguing back points, requesting assignment extensions, etc).
- Organization of notes.
- Organized material well, clear instruction, very approachable
- Presenting the material in an organized way with direct ties to the book used in the course.
- The instructor knew the course material well enough to simplify his teaching of the material to students.
- Very knowledgeable about the material.
  Eager to answer questions, and assist students.
  Easily accessible.
  Prompt grading of assignments and exams.
- Very understanding, displayed interest in the subject AND explained why it's a useful curriculum
- Was receptive to questions and usually answered them well, provided relevant and useful examples. Also sometimes made real-world connections to whatever we were learning, and I thought those were interesting.
- Youngmin was always willing to/eager to make sure the students understood the material. His office hours were consistently helpful for me. He always took time in lectures to answer any questions about the material being presented. The homework was challenging at times, but central to understanding the concepts presented in class. He is a very fair grader.
- Youngmin's strengths were around the theory of linear algebra as well as his ability to proof certain theorems that consistently rise up in Linear Algebra. His best attribute is his ability to help students during office hours
- how to explain the materials to the students in class and in his office hours.

4.2) What were the instructor's major weaknesses?

- Class schedule was changed a few time, but I think that resulted from him not teaching the course much before.
- He ended the class 2 days early
- He writes word for word what is in the book on the board almost as if the class could've been online. I should've not went to class and just struggled through reading the book myself. No out of book examples in his own words were given. This type of teaching is not helpful to me.
- I wasn't a fan of when lectures were covered by Ivan, because he was not as good of a teacher.
- It was hard to understand the course material beyond just how to do the problems. Ivan did a really good job of explaining in a visual way what was going on with each type of problem, how to approach the problems, and what exactly we were solving for
- Maybe made the class a bit too easy (not complaining though) but other people might like to be challenged a bit more.
- N/A (2 Counts)
- None (3 Counts)
- Nothing major, he was pretty great
- Some deviation from the textbook would have been nice, if even just a few new examples.
- Sometimes he would make us jump into problems without giving an example first, and that was a bit frustrating.
- Sometimes more time would be spent on easier examples earlier on in the lecture and harder examples would barely have time to be fully explained, prompting me to have to look them up and learn them on my own.
- Spoke very quickly; keeping up with the lecture was difficult at times.
- Stuck to the book a little too much, but then again that usually works. Don't waste time writing theorems on the board- just give us your spin on it and tell us what it means you can do and can't do.
- Teaching the entire class out of the book, word for word.
- The only weakness, I believe, was not being able to show what was physically happening in a certain concept or theorem.
- i don't believe that there was any major weaknesses
- no weekly quizzes

5. COURSE COMMENTS

5.1) What aspects of this course were most beneficial to you?

- Abstract thinking of linear algebra
- I enjoyed the in class work i think that helped a lot of people understand the information better
- I had to take it, so probably that.
- It replaces a failing grade I earned
- Learning Linear Algebra.
- Learning about real world applications of linear algebra.
- Learning the mathematical subject of linear algebra. Knowing more than 1 method to approach certain problems.
- None
- Office hours and the group exercises in classes.
- Office hours helped reinforce topics I wasn't clear on.
- Stimulated my interest in mathematics again! Every math class I've taken since high school has been taught in an incredibly stale and boring way, usually encouraging memorization and brute force practice for success. This class, either by nature of the course or the way it was taught, never felt like a hassle at all, and even got me curious enough to click around far too many Wikipedia pages on advanced math topics stemming from Linear Algebra that I never would've thought I'd be able to devote any attention to.

- The ability to have homework be a day or two late. Sometimes, if I have a question or another commitment, it allowed me to spend more time actually doing and understanding the problems
- The lectures, office hours and homework/textbook were all beneficial to understanding the class material.
- This stuff is probably going to be relevant to me later, so it was useful in that way. Not much else I can think of.
- Transformations and Eigenvalues/Eigenvectors.
- Useful for solving large systems of equations
- Using the book to reteach myself.
- Working with matrices.
- how to deal with matrices and their techniques

5.2) What suggestions do you have to improve the course?

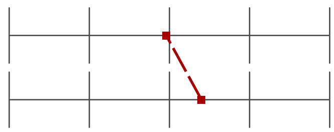
- A bit more discussion of the applications of some of the material.
- For the engineering sections, have sections on concrete applications of the concepts learned. Concepts by themselves are pretty abstract.
- Having some students come to the board and solve problems.
- I don't think I have any suggestions that would markedly improve the course. I learned a lot and enjoyed it.
- I really liked the concept of group practice problems in class because it gives you a chance to learn from your classmates
- Just try to be more individual in your teaching.
- More examples that aren't in the book, that way the student can look in the book for more examples than what was given in class.
- More examples!
- None (4 Counts)
- Nothing else
- Potentially a little more overlap with or reference to MATH0290 Differential Equations. The entire second half of that course is basically advanced applications of Linear Algebra, so the two courses almost blend into one.
- Reduce the amount of equation sheets to use in exams, it's too easy as is.
- Shadow a couple of professors that are well versed in teaching mathematics and get ideas from them that will help your career tremendously.
- To Improve this course i recommend more in class work problems
- Try to spread out time devoted to concepts and examples at the beginning and end of class equally. Other than that, everything else was fine
- n/a

Profile

Subunit: A&S-MATH LOWER LEVEL
Name of the instructor: Professor Youngmin Park,
Name of the course: INTRO TO MATRICES & LINEAR ALG(MATH-0280)-1020
(Name of the survey)

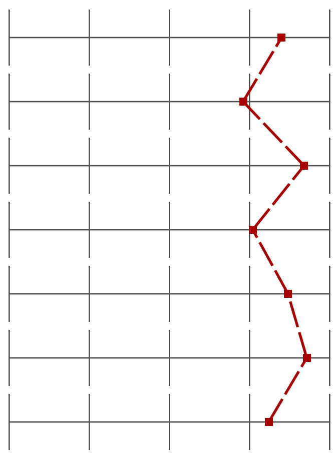
Values used in the profile line: Mean

1. SELF RATINGS



1.1)	Compared to other courses at the same level, the amount of work I did was:	Much less	Much more	n=25	av.=2.96 md=3.00 dev.=0.68
1.2)	In this course I have learned:	Much less	Much more	n=25	av.=3.40 md=3.00 dev.=1.00

2. TEACHING EVALUATION



2.1)	The instructor presented the course in an organized manner.	Hardly at all	To a very high degree	n=25	av.=4.40 md=5.00 dev.=0.82
2.2)	The instructor stimulated my thinking.	Hardly at all	To a very high degree	n=25	av.=3.92 md=4.00 dev.=1.04
2.3)	The instructor evaluated my work fairly.	Hardly at all	To a very high degree	n=25	av.=4.68 md=5.00 dev.=0.63
2.4)	The instructor made good use of examples to clarify concepts.	Hardly at all	To a very high degree	n=25	av.=4.04 md=4.00 dev.=1.17
2.5)	The instructor maintained a good learning environment.	Hardly at all	To a very high degree	n=25	av.=4.48 md=5.00 dev.=0.87
2.6)	The instructor was accessible to students. (Do not answer if no basis to judge)	Hardly at all	To a very high degree	n=21	av.=4.71 md=5.00 dev.=0.56
2.7)	Express your judgment of the instructor's **overall teaching effectiveness:**	Ineffective	Excellent	n=25	av.=4.24 md=5.00 dev.=1.05

University of Pittsburgh
Office of Measurement and Evaluation of Teaching

Dear Professor Youngmin Park:

Student Opinion of Teaching Questionnaire Results

This form contains survey results for DIFFERENTIAL EQUATIONS(MATH-0290)-1040.

Attached is a report in PDF format containing your Student Opinion of Teaching Survey results from last term. The report is best viewed and/or printed in color.

The evaluation results are broken down into three distinct categories. The first part of the report shows a breakdown of student responses to the quantitative questions. For each item, the number of students (n) who responded, the average or mean (av.) and standard deviation (dev.) are displayed next to a chart or histogram that shows the percentage of the class who responded to each option for that question. The percentages are above the number on the rating scale which increases from left to right, i.e. the number 1 equals the least favorable rating and the number 4 or 5 (depending on the scale) equals the most favorable rating. The sum of percentages will equal 100%. A red mark is displayed on the chart where the average or mean is located. To calculate how many students responded to each option, multiply the number of students who answered the question by the percentage for that option. For example, if 14 students answered the question and 50% responded to option 3 then 7 students marked option 3 for that item (14 x .50 = 7). The standard deviation is a common measure of dispersion around the mean that may be useful in interpreting the results.

The second part displays individual comments to each question in the open-ended section of the evaluation. All the responses to the first question will be listed together after the first question and then the responses to the next question will be listed together after the next question, and so on.

The final part gives you a profile of the student responses to the quantitative section of the evaluation. This is a chart listing all of the means for the scaled items with a dashed red line connecting the means.

If the number of respondents for any of the scaled items is fewer than seven, please be cautious in interpreting the quantitative results.

Office of Measurement and Evaluation of Teaching (OMET)

Professor Youngmin Park

DIFFERENTIAL EQUATIONS(MATH-0290)-10402167_UPITT_MATH_0290_SEC1040
2167_12WK
20 RESPONDENTS = 86.96% OF NUMBER REGISTERED

1. SELF RATINGS

1.1) Compared to other courses at the same level, the amount of work I did was:

Much less	1	2	3	4	5	Much more	
	0%	5%	50%	25%	20%		n=20 av.=3.6 dev.=0.88

1.2) In this course I have learned:

Much less	1	2	3	4	5	Much more	
	0%	0%	5.3%	47.4%	47.4%		n=19 av.=4.42 dev.=0.61

1.3) The grade I expect in this course is:

A	50%	n=20
B	25%	
C	20%	
D	5%	
F	0%	
Other	0%	

2. TEACHING EVALUATION

2.1) The instructor presented the course in an organized manner.

Hardly at all	1	2	3	4	5	To a very high degree	
	0%	0%	20%	25%	55%		n=20 av.=4.35 dev.=0.81

2.2) The instructor stimulated my thinking.

Hardly at all	1	2	3	4	5	To a very high degree	
	0%	0%	20%	45%	35%		n=20 av.=4.15 dev.=0.75

2.3) The instructor evaluated my work fairly.

Hardly at all	1	2	3	4	5	To a very high degree	
	0%	0%	10%	30%	60%		n=20 av.=4.5 dev.=0.69

2.4) The instructor made good use of examples to clarify concepts.

Hardly at all	1	2	3	4	5	To a very high degree	
	0%	0%	25%	30%	45%		n=20 av.=4.2 dev.=0.83

2.5) The instructor maintained a good learning environment.

Hardly at all	1	2	3	4	5	To a very high degree	
	0%	0%	15.8%	31.6%	52.6%		n=19 av.=4.37 dev.=0.76

2.6) The instructor was accessible to students. (Do not answer if no basis to judge)

Hardly at all	1	2	3	4	5	To a very high degree	
	0%	0%	10.5%	31.6%	57.9%		n=19 av.=4.47 dev.=0.7

2.7) Express your judgment of the instructor's **overall teaching effectiveness:**

Ineffective	1	2	3	4	5	Excellent	
	0%	0%	15%	30%	55%		n=20 av.=4.4 dev.=0.75

2.8) Would you recommend this course to other students?

Probably not	20%	n=20
Probably yes	55%	
Definitely yes	25%	

2.9) Would you recommend this instructor to other students?

Probably yes	25%	n=20
Definitely yes	75%	

3. MATH TA/TF ADDITIONAL ITEMS

3.1) Did you experience difficulty in comprehending your lecture instructor's spoken language in class?

No difficulty at all	100%	n=20
Small amount of difficulty	0%	
Moderate difficulty	0%	
Severe difficulty	0%	
	0%	

3.2) Did your lecture instructor experience difficulty in comprehending the questions that were asked by students in class?

No difficulty at all	90%	n=20
Small amount of difficulty	10%	
Moderate difficulty	0%	
Severe difficulty	0%	

3.3) The lecture instructor's writing on the chalkboard was legible.

Seldom	0%	n=20
Sometimes	0%	
About half the time	0%	
Usually	40%	
Always	60%	

3.4) The lecture instructor's attitude toward the subject was enthusiastic.

n=20

Hardly at all	0%
To a small degree	0%
To a moderate degree	15%
To a considerable degree	55%
To a very high degree	30%

3.5) Compare to most courses I've taken, the lecture instructor treated students with respect.

n=20

Much less	0%
Somewhat less	0%
About the same	25%
Somewhat more	20%
Much more	55%

3.6) The lecture instructor was available for help during his/her office hours.

n=20

Very seldom	0%
Sometimes	5%
Frequently	15%
Almost always	60%
Cannot judge	20%

3.7) The lecture instructor arrived for class on time.

n=20

Rarely (less than 20% of the time)	0%
Seldom (20-40% of the time)	0%
About half the time (40-70% of the time)	0%
Usually (70-90% of the time)	5%
Over 90% of the time	95%

3.8) Lecture instructor provided the opportunity for questions.

n=20

Very seldom	0%
About half the time	5%
Frequently	25%
Almost always	60%
Cannot judge	10%

3.9) Helpful answers were given to questions raised in class.

n=20

Very seldom	0%
About half the time	5%
Frequently	20%
Almost always	65%
Cannot judge	10%

3.10) Would you recommend this lecture instructor to a friend taking this course?

n=20

Not at all	0%
Unlikely	0%
Don't know	5%
Maybe	20%
Definitely	75%

4. TEACHING COMMENTS

4.1) What were the instructor's major strengths?

- Always prepared notes ahead of time and was able to cover the course material effectively. Additionally, he was able to answer any questions raised about the subject.
- Clear, effective explanations
  Respectful and helpful
  Worked with students who had previously planned events
  Provides an opportunity for bonus points by putting together a presentation on a related topic, which gave insight into mathematical applications related to the information taught in class
- Explain
- He is very smart, kind and we'll spoken.
- He was able to explain complicated concepts in very easy to understand terms.
- He was really easy to understand, he conveyed the material to us really well, and was always welcoming at office hours and if you couldn't make it to office hours he was very accommodating. He definitely cares about his students and wants us all to succeed. This is my third time taking this course and this is the first time I ever felt like I could actually understand the material and that it wasn't out of reach of my comprehension.
- He was super chill.
- He was very knowledgeable of the topics. If you try, it is also easy to do well in the class.
- He was very well organized and his examples helped me understand the subject matter.
- He was very willing to help and you can tell he cares about the success of his class. He wants to ensure students learn and have the opportunity to do well. He answers any and all questions and makes himself available if help is needed. He gives opportunity for extra credit and a chance to improve.
- His accessibility and flexibility to meet with and help students
- Instructors lectures were easy to comprehend and understand because he is good at speaking clearly and loudly.
- Know about the materials
- Problem solving, answering questions, helping students raise grades
- Thorough explanations
- Very clear handwriting and examples. He also focused on material that would be on the tests, thus cutting down on useless information.
- Very concise, taught the material thoroughly, and graded fairly. Thanks for a good summer course.
- Very high knowledge of the subject. He also presented very valuable example that coincided with the section of the course we were learning. He seemed to care about whether his students were learning the subjects and truly cared to answer their questions in a clear and concise way.
- Youngmin had a good understanding of the students' perspective as graduate student. Many instructors seem to lose that understanding as they get farther from their college years
- class was organized well. Most of the examples applied to HW without making it too easy. Very willing to answer questions. Very accomodating.

4.2) What were the instructor's major weaknesses?

- Arithmetic errors
- At times it was too fast paced as I sometimes need more time to comprehend a subject
- At times, he worked a bit faster than I would have liked and could have slowed down.
- Didn't notice any
- He did not get the full class attention all the time.
- He did tend to move fairly fast through class, though that might have been because of the amount of material that needed to be covered.
- He would occasionally move at a pace that became hard to follow, but he left notes on the board long enough for students to ask questions or understand the example presented.
- He would sometimes move too quickly for me to take good notes.
- I can't really think of any, I mean the class as a whole has been really fair!
- Most of the material covered in the reviews were not on the exams.
- N/A
- None
- None.
- Nothing
- Sometimes moved a little fast, but was always able to clarify if needed. Writing was occasionally a little small and hard to see from the back of the class, but still legible most of the time.
- The class could be more engaging. He simply goes through lecture and examples without pausing. It is sometimes difficult to follow lecture since he flies through the concepts and examples. It makes it hard to understand the subject if he does that. Sometimes he lets us try an example before he goes through the answers and I wish he would do that more. I found that effective to my learning.
- explain
- n/a
- sometimes notation was inconsistent

5. COURSE COMMENTS

5.1) What aspects of this course were most beneficial to you?

- All of it, he presented the class in a very practical matter.
- Being able to have one on one time with my instructor to go over questions and being able to email him questions and receiving beneficial answers in return and his willingness to help.
- He was able to cover the material much more clearly than my previous professor so I feel like I learned much more this time around.
- I need it for engineering
- I think I learned more than I thought I would. The homework problems helped and the exams were doable.
- I think taking written problems to turn in was highly beneficial.
- Knowledge
- Learning about how differential equations bridges different math concepts and classes.
- None.
- The examples that went along with the course were very beneficial helped to learn the content presented. I feel they were the best problems to assist with the main concepts
- The examples.

- The lectures and homeworks really helped me understand the concepts.
- The math covered that is needed for engineers.
- The teacher was very well spoken and did a great job explaining.
- Very beneficial to my major and has helped prepare me for higher level engineering classes.
- Youngmin was very approachable and made it much easier to ask questions or for help
- almost everything
- n/a
- the in class examples

5.2) What suggestions do you have to improve the course?

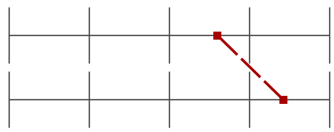
- Do more in-class interactive examples
- Every single Differential Equations course should be taught with Youngmin's guidance. He's relatable to students and real, he tells you when you do and don't need to know things without straight up telling you what is on the exam. And he makes the dumb things fun, we had a class of presentations for extra credit and we won pottery for presumably teaching the students the most about our topic. It just made it fun, funny, and different. It wasn't overbearing and you weren't screwed if you never did the homework because it didn't need to be turned in and then at the end of the semester you didn't know anything. Homework was always done and in on time and he was accommodating to student with vacations/excuses.
- I stated them already. I think it would be good to make the class more engaging. Otherwise I thought the class overall was good and the professor made an effort to make sure students were learning and doing well by offering help and any extra credit.
- I would suggest possibly providing practice test from other times this class was taught. Some uncertainty on what exactly to expect from the test.
- Less focus on physics concepts early on.
- Make sure you aren't moving too quickly.
- More time on exams.
- More young instructors that understand the student perspective. I have had friends really struggle with other instructors for this subject
- No
- None
- None really, I believe the material was covered effectively and therefore the course doesn't require much improvement.
- Not sure.
- Nothing. It was perfect.
- Possible offer this course over a longer period of time though this is probably limited to the university's constraints.
- Possibly homework solutions being made available after each homework was turned in.
- Provide tons of practice exams with solutions please.
- Talk a little louder.
- in general (not this section): get rid of the departmental final. Don't recommend getting the matlab supplement when it is not relevant. revise calc 2 material so that it mimics the notation used in this course to remove unnecessary confusion
- more in class examples time allowed

Profile

Subunit: A&S-MATH LOWER LEVEL
Name of the instructor: Professor Youngmin Park,
Name of the course: (Name of the survey) DIFFERENTIAL EQUATIONS(MATH-0290)-1040

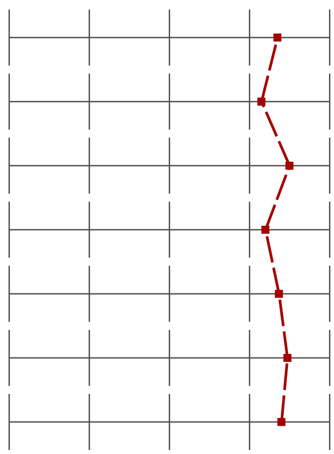
Values used in the profile line: Mean

1. SELF RATINGS



1.1)	Compared to other courses at the same level, the amount of work I did was:	Much less	Much more	n=20	av.=3.60 md=3.00 dev.=0.88
1.2)	In this course I have learned:	Much less	Much more	n=19	av.=4.42 md=4.00 dev.=0.61

2. TEACHING EVALUATION



2.1)	The instructor presented the course in an organized manner.	Hardly at all	To a very high degree	n=20	av.=4.35 md=5.00 dev.=0.81
2.2)	The instructor stimulated my thinking.	Hardly at all	To a very high degree	n=20	av.=4.15 md=4.00 dev.=0.75
2.3)	The instructor evaluated my work fairly.	Hardly at all	To a very high degree	n=20	av.=4.50 md=5.00 dev.=0.69
2.4)	The instructor made good use of examples to clarify concepts.	Hardly at all	To a very high degree	n=20	av.=4.20 md=4.00 dev.=0.83
2.5)	The instructor maintained a good learning environment.	Hardly at all	To a very high degree	n=19	av.=4.37 md=5.00 dev.=0.76
2.6)	The instructor was accessible to students. (Do not answer if no basis to judge)	Hardly at all	To a very high degree	n=19	av.=4.47 md=5.00 dev.=0.70
2.7)	Express your judgment of the instructor's **overall teaching effectiveness:**	Ineffective	Excellent	n=20	av.=4.40 md=5.00 dev.=0.75

University of Pittsburgh

Summer 2017 - Teaching Survey Report for Youngmin Park

MATH 0290 - DIFFERENTIAL EQUATIONS - 1040 - Lecture

2177 - Teaching Survey Summer 2

Total Enrollment 14
Responses Received 4
Response Rate 28.57%

Subject Details	
Name	MATH 0290 - DIFFERENTIAL EQUATIONS - 1040 - Lecture
DEPARTMENT_CD	MATH
CAMPUS_CD	PIT
SCHOOL_CD	ARTSC
CLASS_NBR	16661
COURSE_NUMBER	290
SECTION_NUMBER	1040
TERM_NUMBER	2177
COURSE_TYPE	Lecture
CLASS_ATTRIBUTE	
ENROLLED_STUDENTS	14
First Name	Youngmin
Last Name	Park
RANK_DESCR	Teaching Fellow
TENURE	NT

Report Comments

Table of Contents:

Instructor and Course Survey Results:

Creation Date Tue, Aug 22, 2017

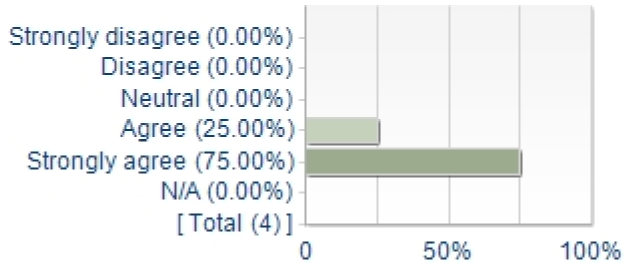
Arts and Sciences Questions

Summary: 5-point scale - Strongly Disagree to Strongly Agree

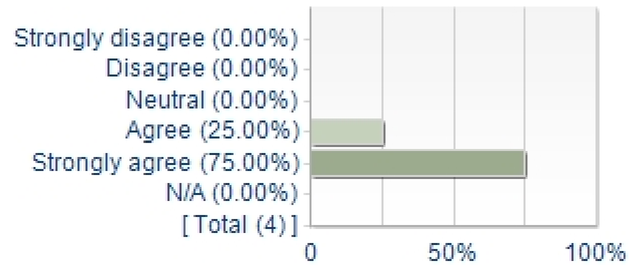
Question	Results		
	Mean	Response Count	Standard Deviation
The instructor created an atmosphere that kept me engaged in course content.	4.75	4	0.50
The instructor was prepared for class.	4.75	4	0.50
The instructor treated students with respect.	5.00	4	0.00
The instructor was available to me (in-person, electronically, or both).	5.00	4	0.00
The instructor evaluated my work fairly.	5.00	4	0.00
The instructor provided feedback that was helpful to me.	4.75	4	0.50
I learned a lot from this course. If there is no basis to judge or not applicable, answer N/A.	4.75	4	0.50
Overall	4.86	-	0.36

Detailed Responses

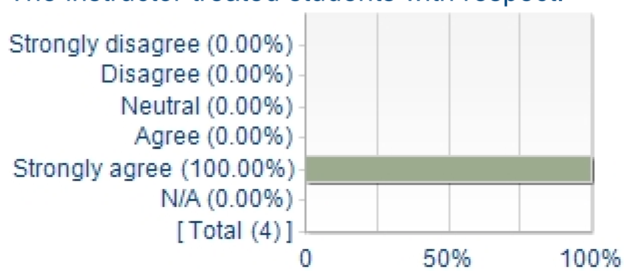
1. The instructor created an atmosphere that kept me engaged in course content.



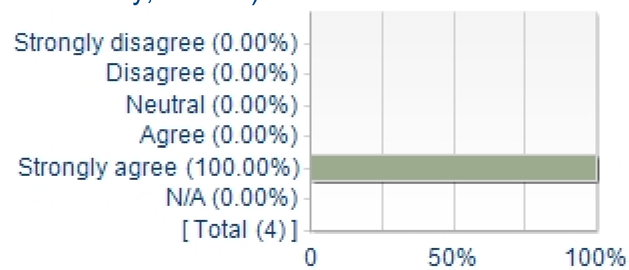
2. The instructor was prepared for class.



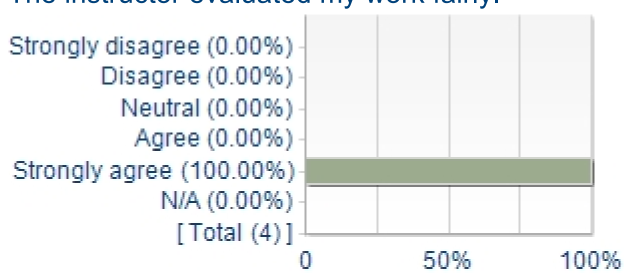
3. The instructor treated students with respect.



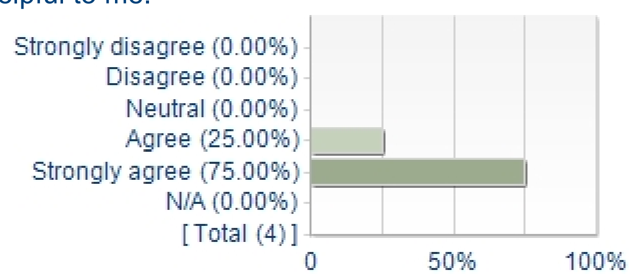
4. The instructor was available to me (in-person, electronically, or both).



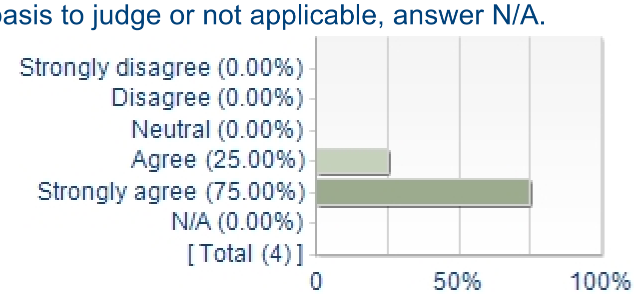
5. The instructor evaluated my work fairly.



6. The instructor provided feedback that was helpful to me.

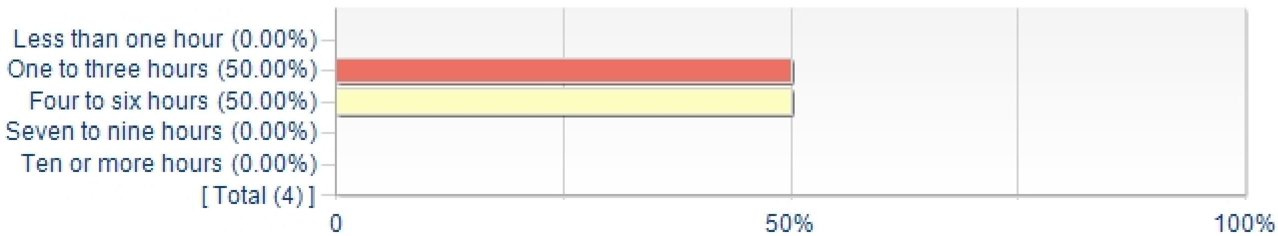


7. I learned a lot from this course. If there is no basis to judge or not applicable, answer N/A.



The standards the instructor set for me were:

How many hours per week did you usually spend working on this course outside of classroom time?



Comments

What did you like best about how the course was taught?

Comments
Mr. Park focused on the stuff that would be applicable to quizzes and tests. He also did a great job of working through difficult questions by taking "bite–size" steps.
Very straightforward. Clear expectations laid out for students

If you were teaching this course, what would you do differently?

Comments
I would maybe spend a little bit more time on how these concepts relate to real life situations and real life applications
I wouldn't do anything differently.

Brandeis University Math 15a (Linear Algebra) Student Feedback
Submitted answers: 10
Questions: 13

	Question	never	rarely	sometimes	frequently	always	n/a - not applicable	
1	**The instructor demonstrates command of the subject matter.**	0	0	0	0.1	0.9	0	
2	**The instructor is fully prepared for class.**	0	0	0	0.2	0.8	0	
3	**The instructor provides clear and comprehensive explanations.**	0	0	0	0.4	0.6	0	
4	**The instructor asks thought-provoking questions.**	0	0	0.2	0.2	0.4	0.1	
5	**The instructor encourages student discussions when appropriate.**	0	0.1	0.4	0.2	0.2	0.1	
6	**The instructor makes sure that everyone understands the material.**	0	0	0.3	0.1	0.6	0	
7	**The instructor is accessible when you seek assistance.**	0	0	0	0.2	0.8	0	
8	**The instructor provides helpful written comments on assignments.**	0.1	0	0.1	0	0.7	0.1	**Average**
9	**The instructor seems genuinely concerned about your learning.**	0	0	0	0.1	0.9	0	**4.311111111**

10	**Please rate the following: Poor (1)...................................(5) Excellent**	**1 (1)**	**2 (2)**	**3 (3)**	**4 (4)**	**5 (5)**	**Not Applicable (0)**	**Average**
	Overall, how would you rate the quality of my teaching?	0	0	0	3	7	0	**4.7**

11 What can the instructor do to improve the course?

A better way to post and submit homework

I liked how you used python to visualize the concept. Maybe use that more in future classes?

Maybe to give us fewer sample questions before exams.

Perhaps teach with powerpoints. I found it hard to follow equations being written on a chalkboard in a large classroom.

I really liked how you gave us specific examples that correspond to each theorem/definition. They really helped me study for the exams and I would've like more examples of similar problems.

The instructor could improve the course by going over the tests and explain each question in class.

maybe use some questions to more closely connect the previous theorem with the new theorem. Could let the students know what chapter would be taught beforehand and let students preview the theorems and examples provided by the books.

12 What where the instructor's weaknesses?

Sometimes I can't hear from the back of the room

Personly speaking, I feel like there could be more general guidelines that show how the theorems from different chapters work with each other and the overall structure of what we learned in class.

The instructor can make his class more engaging.

Sometimes the transition from chapters to chapters is too quick.

No weaknesses, really. You were always willing to answer questions and spend extra time to go explain specific concepts to me. And I know towards the end you started asking more questions and I appreciate your effort to making this class so much fun.

His voice and teaching got monotonous at times.

No weakness, good!

13 What were the instructor's strengths?

Very clear explainations in class, and class notes are very clear.

Very clear and detailed explanations for class material. And I admire how humble and honest you are. I think it really makes the class so much better and more enjoyable. Thank you so much for making my first semester at Brandeis so fun!

Being patient and helpful.

Responsible and patient. Willing to answer any questions.

Explained the material clearly in very clearly in class, always on point, and followed the syllabus thoroughly. Was extremely helpful outside the classroom.

Excellent examples to support the explanation of theorems and definitions, and great pace in going through materials in each class.

Very clear in explaining materials and notes are very organized and easy to understand. Genuinely care about students.

The instructor is very patient with his students and he is knowledgable on the concepts he teaches.

Research Statement

Youngmin Park

1 Introduction

I develop dimension-reduction methods for neural network models using **dynamical systems theory**, and in turn, use these findings to understand how biological neural networks function and how they are maintained. I also specialize in **interdisciplinary research with excellent funding potential**. My publication record demonstrates my ability to produce high-impact work with researchers of diverse backgrounds including neuroscientists [17], engineers [3, 19], mathematical neuroscientists [13, 18, 14, 15], and fluid dynamicists [16]. My research includes the following directions:

- **Coupled oscillators, Section 2**. In summary, I introduced a generalization of coupled oscillator theory, allowing mathematicians to include subtle but important details in reduced phase models that are often neglected by idealized models. This work opens the way for a thorough re-examination of decades of existing oscillator theory that assume either idealized oscillators with strong coupling or general oscillators with weak coupling. There is excellent potential to sharpen questions in problems of diseases such as Parkinsonian tremors.

- **Molecular motors, Section 3**. In summary, I reduced the dimension of a vesicle transport model in confined spaces and analyzed its bifurcations. The model behavior was consistent with experimental observations, suggesting that fluid dynamics forces, molecular motor forces, and the shape of the confinement play significant factors in neural maintenance. This work opens the way for detailed, tractable studies on neural maintenance and how defects in maintenance affect brain function. There is great potential for experimental collaboration. The long-term goal of this work is to help understand the causes and mechanisms behind brain disorders such as Alzheimer's.

- **Undergraduate research, Section 4**. In summary, my work is accessible to a broad spectrum of skills and backgrounds in STEM (although I strongly encourage students from other backgrounds to participate in my research). My goal is to equip students with skills such as programming and scientific literacy, which they can use to enhance their lives and careers.

2 Neural Oscillations

My work on neural oscillations falls within the broader work of oscillator theories oriented towards understanding pathological neural behavior such as Parkinsonian tremors, epilepsy, and cardiac alternans. Overall theoretical work in these directions has been promising, but tend to use one of three starting points: mathematically tractable but very abstract models [11], particular forms of symmetry [5], and the *weak coupling* assumption, or more generally, the *linear* approximation [4]. The weak coupling assumption has long been an invaluable theoretical tool to understand neural behavior consisting of only small deviations from a known behavior such as quiescence or oscillatory activity. Indeed, the weak coupling assumption has driven much of my work [13, 14, 15].

While these assumptions facilitate theorists to a potent degree and were perhaps close to experimental conditions some decades ago, they are now far from modern experimental conditions. Modern experiments are often done *in vivo*, where neurons are often strongly coupled, heterogeneous, and interact nonlinearly. These properties hold in both normal and pathological neural function, so it follows that pathologies can not always be understood using abstraction, symmetry, or linearity. Therefore, my field must develop theories that directly address *strongly coupled* networks of *heterogeneous* neurons with *nonlinear* interactions at multiple scales. We must understand the brain as it is.

To this end, *I have formulated a theory of strongly coupled oscillators* [19]. Consider the coupled system of N ODEs,

$$\dot{X}_i = F(X_i) + \varepsilon \sum_{j=1}^{N} a_{ij} G(X_i, X_j), \quad i = 1, \ldots, N, \tag{1}$$

where each system admits a T-periodic limit cycle $Y(t)$ when $\varepsilon = 0$. We allow $\varepsilon > 0$ not necessarily small and assume general smooth vector fields $F : \mathbb{R}^n \to \mathbb{R}^n$ and a smooth coupling function $G : \mathbb{R}^n \times \mathbb{R}^n \to \mathbb{R}^n$. The scalars a_{ij} modulate the strength of coupling between pairs of oscillators, whereas ε modulates the overall coupling strength of the network.

Let θ_i be the phase of limit cycle Y_i and define the phase difference $\phi_i = \theta_i - \theta_1$ for $i = 2, \ldots, N$. Under general conditions, it is possible to derive a phase reduction of $N-1$ equations,

$$\begin{aligned}\dot{\phi}_i =& \varepsilon \sum_{j=1}^{N} a_{ij} \mathcal{H}(-\phi_i, \phi_2 - \phi_i, \ldots, \phi_N - \phi_i, \phi_j - \phi_i) \\ &- \varepsilon \sum_{j=1}^{N} a_{ij} \mathcal{H}(0, \phi_2, \ldots, \phi_N, \phi_j), \quad i = 2, \ldots, N,\end{aligned}$$

where

$$\mathcal{H}(\eta_1, \ldots, \eta_N, \xi) = \frac{1}{T} \int_0^T \mathcal{Z}(\eta_1 + s, \ldots, \eta_N + s) \cdot G(s, \xi + s) ds,$$

and $\mathcal{Z}$ is the higher-order phase response curve from [22]. My theory produces Taylor truncations of the function $\mathcal{H}$. The higher the truncated order, the more accurately my theory reproduces phase-locked states of N oscillators.

As a first step, I verified my theory using the mathematically tractable complex Ginzburg-Landau (CGL) model with diffusive coupling. The coupling function has two

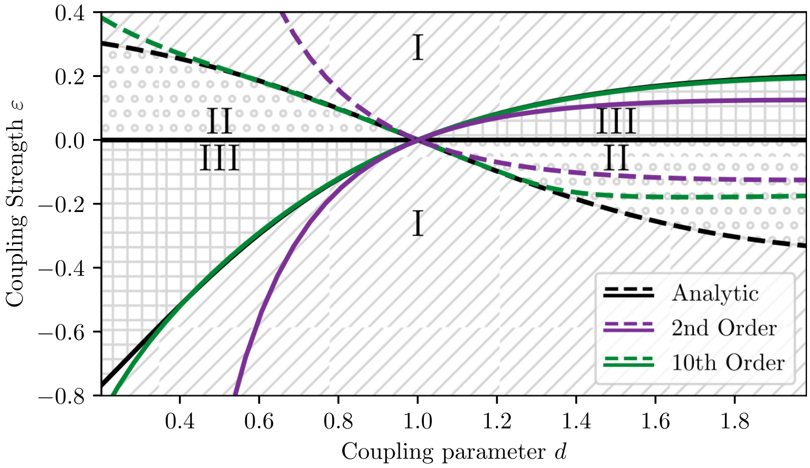


Figure 1: Validation of strong coupling theory using diffusively coupled complex Ginzburg-Landau (CGL) models. The plot is a two-parameter bifurcation diagram in coupling parameters ε and d. Synchrony is only stable in regions I and II, whereas antiphase is only stable in regions I and III. Black solid lines denote boundaries where the system switches between stable and unstable synchrony (ε_s). Black dashed lines denote boundaries where the system switches between stable and unstable antiphase (ε_a). Purple solid, dashed: bifurcations detected using 2nd order interaction functions from [23]. Green solid, dashed: bifurcations detected using 10th order interaction functions. **This result shows that my strong coupling theory substantially outperforms existing coupling theory.**

parameters: ε for the coupling strength, and d for the degree to which opposing species affect coupling. Both parameters significantly affect the phase-locking properties of the coupled CGL models. I show the accuracy of the theory in the left panel of Fig. 1, where the strong coupling theory (green, tenth-order) coincides strongly with the ground-truth (black) relative to existing coupling theory (purple, second-order) [23].

Next, I tested this theory using a realistic four-dimensional model of a thalamic neuron. Figure 2 shows how my theory predicts phase differences in two thalamic oscillators for different coupling strengths (higher order corresponds to greater accuracy). The right-hand side of the reduced ODE (labeled $-2\mathcal{H}_{\text{odd}}$) is shown in the top row. Roots and slopes correspond to existence and stability of phase-locked states. Phase differences of the full model is shown in the bottom row for 20 difference initial conditions. Coupling strength increases from weak ($g_{\text{syn}} = 0.02$, left column) to strong ($g_{\text{syn}} = 0.25$, right column). **Roots of the fourth-order reduction coincide with the steady-state phase-locked states of the full system**.

These results demonstrate how my theory is not specific to particular models or coupling functions. Indeed, my theory naturally applies to general coupled oscillator models including those found in physics, biology, and chemistry (the only requirement

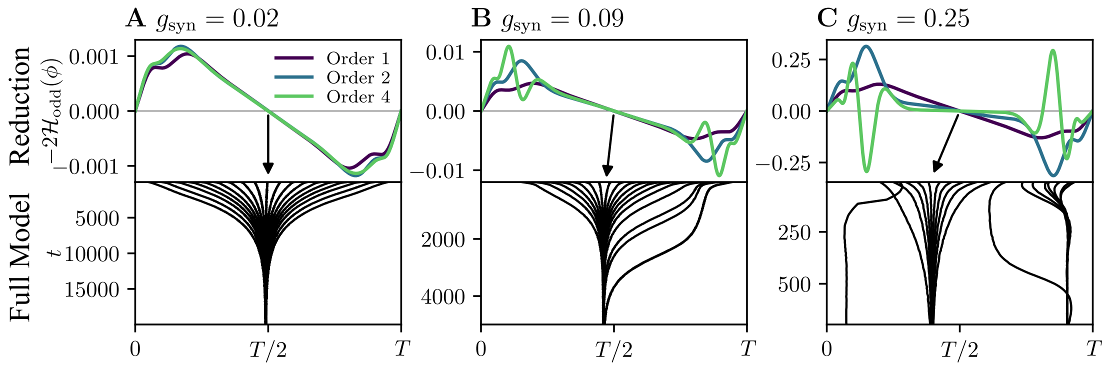


Figure 2: Performance of the strong coupling reduction compared to a full simulation of thalamic neuron models. A: Weak coupling. The right-hand side of the reduction (top) is shown for different orders (higher is more accurate) and coincides with the long-term phase difference of the full model (bottom). B: Moderate coupling. The reduction (top) coincides with the full model (bottom). C: Strong coupling. The reduction (top) only agrees with the full model (bottom) at order 4.

is that the vector fields of the models are sufficiently smooth).

2.1 Future Work

In the long term, I will further develop mathematical methods to analyze neural networks in several important directions. I will augment my theory to include heterogeneity (including n:m phase-locking), making my theory applicable to far more realistic neural networks. I will augment my theory to include oscillator death to understand interactions between bursting neurons in networks such as subcortical networks and central pattern generators. Finally, I will derive the mean-field equations for neural models (in contrast to existing mean-field theories that use idealized models [11]) to understand how microscopic neural interactions influence large-scale brain activity.

3 Neural Maintenance: Dendritic Spines

While neural interactions are an important part of understanding how brains function, questions of neural maintenance are equally important. Seemingly minor defects at the nanometer-to-micrometer scale can result in serious disorders at the scale of the whole brain. For example, deficits in molecular motor transport in axons are implicated in neurodegenerative diseases such as Parkinson's disease [9]. Another example involves pyramidal neurons, the most ubiquitous type of neurons in the mammalian neocortex. They feature tens of thousands of excitatory convergent synaptic inputs, where most incoming synaptic signals terminate on sub-micron bulbs known as dendritic spines [10]. Spines exhibit a significant degree of morphological plasticity [7] with pathological spine formation implicated in disorders such as Autism spectrum disorder and Alzheimer's disease [20]. How spines function and how they are maintained is therefore an important question.

Dendritic spines receive surface proteins by protein-carrying vesicles that squeeze through the neck of the spine and eventually fuse with the spine head [2]. The motion of such vesicles has been observed to not involve only translocation, where the motion is unidirectional, but includes corking, where the vesicle gets "stuck" in the spine neck, and rejection, where the vesicle initially enters the spine but eventually reverses direction and exits [12]. **How molecular motors affect changes in vesicle direction is the goal of ongoing work**.

Indeed, the importance of this problem has spurred an extensive literature on the effects of molecular motors on vesicle dynamics, including the computation of the distribution of cargo velocities [8], computing mean first passage times to transport targets on dendritic morphologies [1], and the generation of bidirectional motion despite the assumption of symmetry [21]. *However, these studies often neglect or fix drag forces which could arise from constriction effects in the unique bulbous shape of dendritic spines.*

To this end, I have reduced a fluid dynamics model of dendritic spine transport into a tractable fast-slow system:

$$\begin{aligned} \frac{dZ}{dt} &= U, \\ \varepsilon\frac{dU}{dt} &= F(U) - \zeta(Z)U. \end{aligned} \tag{2}$$

F is the net motor force, U is the vesicle velocity, Z is the vesicle center of mass, and ζ is the function that captures information about the constriction geometry at position Z.

Standard dynamical systems theorems (Fenichel theory) allows us to view the equivalent system in the limit $\varepsilon \to 0$,

$$\frac{dU}{ds} = F(U) - \zeta U,$$

where ζ is a parameter and $s = t/\varepsilon$. Using this reduced system, I proved the unique existence of unidirectional motion for sufficiently close vesicle-to-spine diameter ratios. The two-parameter diagram in the confinement factor ζ and the ratio or up- and down-motors ϕ is shown in Figure 3. In summary, the two-parameter diagram (panel D) predicts that smaller ζ (wider constrictions) tend to show bidirectional motion, whereas larger ζ (tighter constrictions) predict unidirectional motion.

This result is consistent with experimental observations of vesicle trajectories in the literature [16]. Experimentally-observed vesicles traveling into thin spines with tight constrictions tend to exhibit unidirectional motion, whereas vesicles traveling into wider, stubby spines tend to exhibit bidirectional motion. The consistency suggests that fluid flow in dendritic spines combined with molecular motor forces contribute significantly to bidirectional vesicle motion. Neurons may modify spines to become wider or thinner depending on the needs of the synapse.

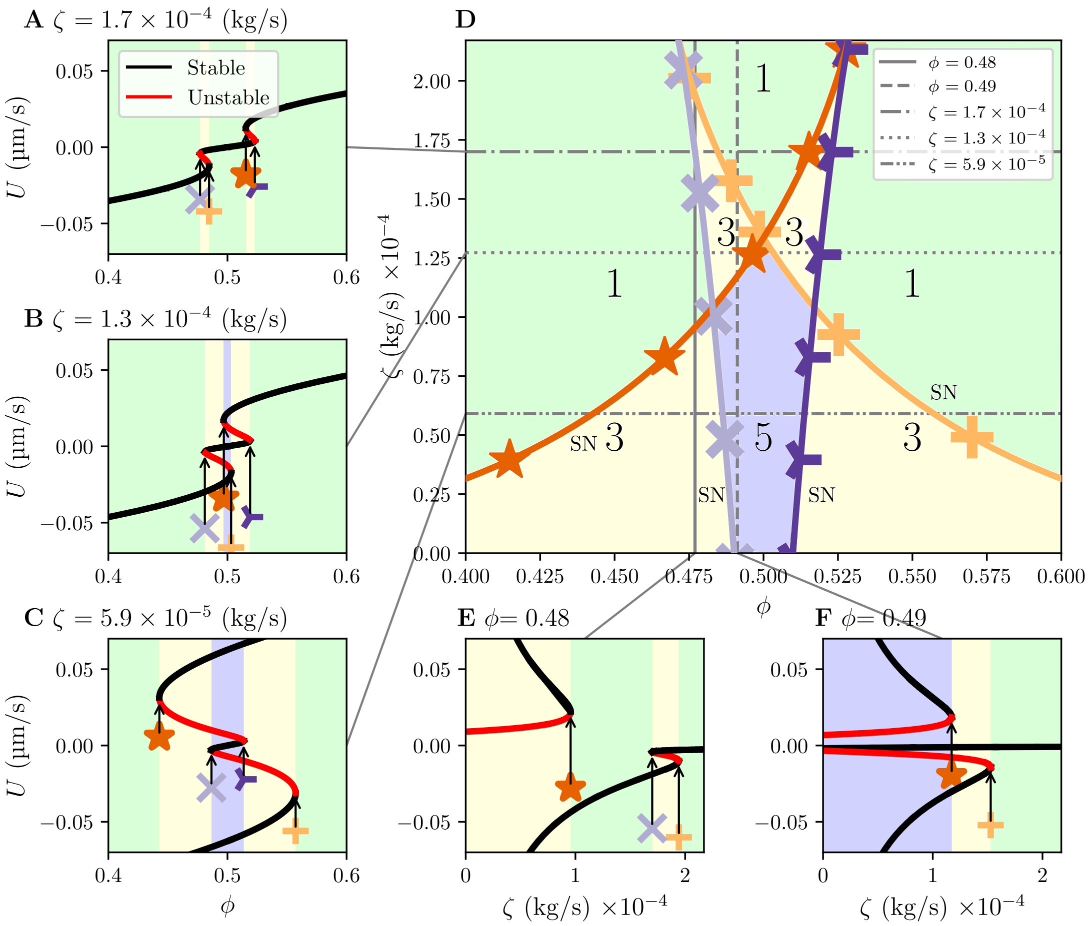


Figure 3: Two parameter bifurcation diagram in ϕ and ζ. Saddle-node (SN) bifurcations are shown in (D) as colored branches with a unique color and symbol. Numbers in (D) indicate the total number of fixed points in the corresponding region of parameter space. Subplots A, B, C, E, F, show one-parameter slices of the two-parameter diagram. Saddle-nodes are labeled with the corresponding branch color and symbol. The critical vesicle-to-spine diameter ratio at the cusps is roughly 2 µm/3 µm.

3.1 Future Work

While mean-field models are useful with large numbers of agents, sub-micron spines only contain a few dozen myosin motors. *The effects of noise are prominent, and we can not rely on mean-field models to fully understand how spines function.* Thus I will shift my attention to understanding how finite numbers of stochastic motors affect the probability of translocation.

Before turning to the probability of vesicle translocation, I will focus on the specific question of the mean first passage time (MFPT) to switch the direction of vesicle motion.

This switching is a well-known "tug-of-war" effect [6] that has not been studied using myosin motors or with constrictions. I have developed an agent-based simulation where individual myosin motors attach and detach with position-dependent rates in order to compute MFPTs. However, agent-based simulations are computationally expensive: to obtain mean first passage times (MFPT), roughly 5-10 trials must be run in parallel over 50-100 time units with time steps on the order of 1e-6. These requirements mean dozens of hours per simulation. I will overcome the problem of long simulation times through the use of a master equation approximation.

4 Undergraduate Research

Virtually any STEM student with a basic understanding of calculus and ordinary differential equations will be able to contribute to my research. My students will first learn the fundamentals of the field of their choosing. For example, a student interested in coupled oscillator theory will learn about phase response curves, return maps, and weak coupling theory, and a student interested in molecular motor dynamics and cellular transport will learn about stochastic calculus, PDEs, and numerical analysis. I will also introduce them to state-of-the-art research through journal club discussions. This process will lead them towards research questions of their choosing, and I will guide them towards tractable problems. Driven students will have the opportunity to publish first- and second-author papers in reputable journals.

My goal is to provide undergraduates many opportunities to learn important and relevant skills. They will develop the ability to extract essential features from complex problems. They will learn to program in languages of their choosing to generate figures for abstract mathematical concepts. They will learn to communicate in speech and writing by interacting with others of different STEM backgrounds. I truly hope to have a diverse lab of varying majors, e.g., biology majors who interact with and learn alongside computer science majors, who are capable of presenting their work clearly and concisely to another diverse audience, e.g., consisting of math and English majors.

Below are potential project ideas from simple to complex, to be given depending on the skill, interest, and commitment time of the student. I remark that I fully understand the potential for a relatively unskilled and uninterested student to turn into a skilled and dedicated researcher, so this list is by no means a hard rule.

- (Simple) Reproduce figures from a paper of the student's choosing and present on the main results. Generate potential research ideas based on the paper.

- (Simple) Help improve the documentation for my open source projects in coupled oscillators and molecular motor dynamics. Contribute features to these projects.

- (Moderate) Join an ongoing research project. For example, generate figures for a paper using a language and numerical integrator of their choosing. The student will be tasked with visualizing a particular problem and will be responsible for writing and debugging their own code from top to bottom.

- (Complex) Lead a research project. For example, study the effects of splay states using strong oscillator coupling theory. Determine different types of bifurcations as a network transitions from different phase-locked states as a function of a network parameter, such as coupling strength.

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