TEACHING PORTFOLIO

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1. INTRODUCTION

My teaching experience comprises over 8 years of college level instruction. I have taught courses ranging from single-variable calculus to upper division courses in analysis, differential equations and applied mathematics, as well as graduate courses and seminars in these fields. I have also mentored and advised undergraduate and graduate students both formally and informally. Overall, teaching has been a crucial and dear part of my professional career in academia, and I am looking forward to continuing enriching my life with the excitement of teaching - constantly looking for new challenges and ways to improve my pedagogical skills and the outcomes of my instruction.

I also enjoy creating educational content, such as handouts, lecture notes, interesting applications and problems, etc. While at University of California Santa Barbara (UCSB), I developed lecture notes for the undergraduate Partial Differential Equations (PDE) and Fourier Series/Numerics courses, which were subsequently used by other faculty teaching the same courses. Having put the notes on the internet, I have received numerous e-mails of appreciation from both students and faculty using my notes at various institutions both in and outside of US.

I am deeply committed to excellence in teaching. As a result of this commitment, I was awarded the Mochizuki Teaching Award in the Department of Mathematics at UCSB for “outstanding achievement in teaching”. To further improve my teaching, I also actively seek the advise of senior colleagues, and regularly invite them to observe my classes and engage in discussions about what they thought were my strengths, and which areas may benefit from further attention. Excerpts from reports resulting from such classroom observations are quoted in Appendix A (Peer Evaluations).

What follows is my overall teaching philosophy, list of classes I have taught and short explanations of some of the formal student mentoring that I have done. Some excerpts from reports of faculty colleagues on my teaching observations are collected in Appendix A, while Appendix B contains some excerpts from student evaluations I have received over the years. Some more information about my teaching and examples of syllabi, course outlines and teaching materials can be found by visiting my website at

http://sites.oxy.edu/vgrigoryan/teaching/
2. Teaching philosophy

Teaching is an exploration trip for me, that I and my students embark upon in the courses that I teach. During the term of the course we sail the high seas of reason and logic to visit the landmasses of Mathematics. Once there, we thoroughly explore the territory, finding the water sources feeding the life, and drawing maps at different scales, to understand the entire landscape of the land. And on these trips the students learn of new worlds, become skillful navigators, and get infected with the incurable passion for life-long exploration.

– Questions? – is how I start each and every single of my class meetings. But before this, I chat with the students, about the week already lived - theirs and mine, and the rest of the day to come. About math, or ... not. In these little chats we all let go of the last class, the worries of looming deadlines, the anxiety of the school, and anything else that took hold of our attention. And within a couple of minutes, we are ready for the class. And then this question brings us all to math!

That question signifies the students’ roles in the courses that I teach. They are the explorers asking the questions – I’m just their guide. And it also tells them that their questions are welcome, no matter how silly or meaningless they may seem in their heads. And once we discuss and find answers to all the questions from the class, I get a turn to ask the questions - leading them to the discovery of new lands. Even during the short lectures, I constantly encourage students to think of the next steps, asking them guiding questions, and following their suggestions all the way to logical conclusions. Often times their suggestions work, and sometimes they don’t, taking us to a seeming dead-end, but even stronger reinforcing everyone’s understanding.

During the class meetings we have short lectures, worksheets, inquiry based exercises, problem sets, group discussion – all means of discovery and exploration. Some students may prefer one activity to another, but the mixture keeps them all engaged, switching their attention from listening to thinking, from following, to breaking things down and retelling their thoughts to others. Such variety of different learning modes keeps the students engaged and helps them enjoy the educational process.

My classes are truly living organisms. Many dialogs between students and myself keep it breathing and alive. It feels amazing to see the virtual light bulbs lighting up in the students’ heads. But the rapport I make with students via mutual respect allows me to quickly see, if the lights are bickering instead of shining bright. In such cases I’ll change-up the example, switch to another activity, let them get their hands dirty with relevant exercises. Using the friendly atmosphere in my classes, I also try to use examples to which the students can easily relate. Say, talking about directional derivatives, I’ll invite the students to visually put me on an imaginary mountain, and give me directions to trails with different steepness. This, augmented with a few goofy steps I make, gives them a deeper grasp of the subject, and a few chuckles as well. When talking about coprime integers, I may give them an exercise of computing the change for a transaction in an economy that uses only, say, $8 and $15 notes. In a word, I try to help them enjoy math, and the learning of it will surely ensue.

An undeniable part of learning mathematics is solving problems. When choosing exercises to do during the class meetings, or when assigning homework, I try to employ problems that teach – by emphasizing conceptual understanding, rather than formula memorization. A playful way that I found helps to deemphasize formulas is to genuinely confess during our meetings that I have forgotten a particular formula, but “oh, fear-not”, I proceed to derive it for them in seconds, using the concepts we learned in the class. The first time they witness this, some of the students think...
I'm a fraud. A few more “amnesic occurrences”, and they are sold on advantages of conceptual understanding over memorizing cumbersome formulas.

An integral aspect of knowledge is to be able to communicate it to others in both written and oral forms. To facilitate such level of proficiency in the subject matter, I engage the students in opportunities to articulate their acquired knowledge. Be this by asking questions during class-time or office hours, explaining their thoughts to their fellow students during group work, or preparing in-class presentations, students spend time reprocessing their learnings, and as a side-effect, become better mathematical communicators. Where possible, I also try to give them online assignments, in addition to the regular written homeworks, and encourage the students to e-mail their questions to me. This also helps them to think about the difficulties with a particular problem or the material, when putting a question together in a written form. In upper division classes I help and encourage the students to learn \LaTeX, and use it for their assignments, which gives them an opportunity to master a widely used technical tool. I’ve also used online office hours, where students ask me and each other questions (using the \TeX-filter in moodle to typeset math formulas) in real-time chat format, which was a great success with the upper division courses I taught at UCSB.

I love teaching! And try to find ways of enjoying it... even when it requires grading hundreds of exams over the weekend (hey, they draw pictures sometimes). And this love of the craft is inevitably visible to students. It creates a trust, and lets them shed their reservations, and start enjoying the classes, the subject, and even learn to love math. And we certainly need our students to become ambassadors of their knowledge. I used to tell a friend that I was in the business of changing lives. A bit presumptuous, I know, but my love and passion for teaching has changed at least one life for the better - mine! And I hope that my continuous efforts to make learning math enjoyable for every single student in my classes have a positive effect on theirs, too.

And...

- Questions? – is how all my class meetings conclude, implicitly telling the students that the questions one must ask should never end.
3. LIST OF COURSES

At the college level I have taught at University of Massachusetts Amherst (UMass), University of California Santa Barbara (UCSB), and Occidental College (Oxy).

**Occidental College, 2012–present**

The calculus courses (100 level) normally have 30-35 students, while the upper division classes have 20-30 students, with the senior level classes (300 level) having 10-15 students. The calculus classes have “4th hour” labs, which meet once a week for 1.5 hours. These are normally ran by the instructor teaching the course.

- Calculus II (Math 120) – Fall 2012, 2013
- Calculus II - AP (Math 128) – Fall 2012
- Multivariable Calculus (Math 212) – Spring 2013, Fall 2013
- Linear Algebra (Math 214) – Spring 2013
- Partial Differential Equations (Math 342) – Spring 2014
- Mathematical Models in Biology (Math 392) – Spring 2014

**University of California, Santa Barbara, 2008–2012**

Lower division classes (sub-100 level) have 125-300 students in large lectures, with associated 20-25 student discussions sections ran by graduate TAs. The upper division classes have anywhere from 20 to 45 students, while the graduate classes have 10-15 students.

- Calculus with Applications I (Math 3A) – Spring 2009
- Vector Calculus I (Math 5B) – Spring 2010
- Transition to Higher Mathematics (Math 8) – Spring 2010
- Calculus for the Life and Social Sciences I (Math 34A) – Winter 2009
- Calculus for the Life and Social Sciences II (Math 34B) – Spring 2009
- Methods of Analysis (Math 117) – Spring 2011
- Ordinary Differential Equations (Math 119A) – Winter 2012
- Chaotic Dynamics and bifurcation Theory (Math 119B) – Spring 2012
- Partial Differential Equations (Math 246B, graduate) – Winter 2011

In addition to the above classes, I also organized and was the main speaker in a graduate seminar on Nonlinear Wave equations, which was attended by 7-12 graduate students and several faculty members.

**University of Massachusetts, Amherst, 2002–2008**

All classes taught had around 30 students. Calculus classes taught during regular semesters (Fall and Spring) were sections of multi-section courses, each having associated discussions sections.

- Ordinary Differential Equations for Sci/Eng (Math 331) – Spring 2003
• Calculus for the Life and Social Sciences II (Math 128) – Summer 2002
• Teaching assistant for Calculus I, Calculus II, ODE for Sci/Eng

In addition to the above classes, I also co-organized and was one of the two main speakers in a graduate seminar on Functional Analysis, which was attended by 5-8 graduate students. I also ran Review Sessions for the Qualifying Exams in Advanced Calculus and Topology.

4. MENTORING

In addition to freshmen and major advising at Occidental College, as well as informal advising of students in my math classes, I have mentored senior undergraduate students in their comprehensive (capstone) projects at Occidental College (Oxy) and served as an ad-hoc advisor for the Ph.D. thesis of Allison Tanguay at University of Massachusetts Amherst.

My approach to mentoring students is to serve as a guide, helping them navigate the literature and giving hints when the project hits an obstacle. I schedule regular (usually weekly) meetings with students to touch base and discuss their progress, and to see if a gentle push may be necessary to keep the project going. This also gives the students an opportunity to discuss their projects with someone, and get feedback on their work.

In general, whenever giving advise, I do my best to give the student all the information that I posses, and provide support in the student’s own decision making. In this way I hope to give the students a chance to learn how to make their own decisions with the available information, which makes for a better learner and researcher.

Below is a list of students’ projects, in which I had the privilege to be involved as a mentor.

• Ian Husted, 2012-2013, Oxy — mentored Ian’s independent study of several research papers on Auction Theory, and advised him on filling in the details of these papers and writing a senior thesis titled “Auction Theory and Revenue Equivalence”. For the excellent thesis and its brilliant presentation Ian earned graduating honors.

• Abigail Martinez, 2013-2014, Oxy — proposed a project, and mentored Abigail’s independent study on SIR models for the spread of a disease. Abigail read and prepared a report on a paper describing an exactly solvable SIR type model.

• Allison Tanguay 2010-2012, UMass — advised Allison on her Ph.D. project over means of telecommunication and several personal visits. This involved helping navigate and understand relevant references, giving hints and guidance during her independent research, and advising on the form and content of her final thesis.
Appendix A. Peer Evaluations

"I was unfamiliar with his skills in the classroom when he first talked to me about writing a letter on his teaching, so I asked him on the spot to teach the first half of my 233 [Multivariable Calculus] class. Although the class started only 15 minutes after he approached me about the letter, he had no qualms about teaching in front of me. (He had already prepared the same material for his own upcoming 233 class the next day.) Watching him in the classroom, I noticed his gentle pace at presenting the material. He did not rush the students through the definitions. He has a very unassuming air about him which I think made the students more comfortable. Indeed, even one of my weaker, quieter students summoned the courage to ask him to repeat some material. When he got to the examples, he remembered to ask them how to proceed at various steps, to ensure that they were as engaged as calculus-conscripts can be. He ended his presentation with a short question-and-answer session, during which the students asked him questions for which he had not prepared. Again, he presented the material in a gentle manner, asking the students for input at the appropriate times.

Michael Sullivan"

Prof. Michael Sullivan observed me teach his Multivariable Calculus (Math 233) class in Fall 2007 at University of Massachusetts (UMass). He was the chair for the multi-section Multivariable Calculus course in the Department of Mathematics and Statistics at UMass at the time. I was the instructor of one of the sections of the course, as well as the course-wide TA (holding help sessions for the students of all sections).

"I visited one of Viktor’s lectures on Partial Differential Equations while he was at UCSB. Viktor started the class by reviewing what had been done in the previous lecture, which in this case was the derivation of the fundamental solution for the heat equation. Viktor asked questions to the students as he reviewed the material, and I was surprised to see how many students participated in the discussion. He continued with the new material, and before he did any rigorous proof, or introduced any new concepts, he tried to develop some intuition about it. At the time I had not read the students’ evaluations for his earlier courses, and so I did not know what to expect. I was however very impressed with his class and his style, and now that I have read them, agree completely with the comments made by the students in the evaluations.

Carlos Garcia-Cervera"
I was impressed by his natural talent as a teacher. He explains abstract concepts in plain and clear language. His treatment of the subject was rigorous and careful, but at a level appropriate for first year students. He gave a well-organized lecture, first explaining the theory, followed by several good examples. This is all the more impressive considering that Viktor does not use lecture notes in class! Viktor’s speech had a great tone, just the right speed, and was accompanied by a warm smile and frequent eye contact. His students were attentive throughout the lecture. They seemed at ease and participated actively, answering questions posed by Viktor, as well as asking questions of their own.

Ramin Naimi

Prof. Ramin Naimi observed my Calculus 2 (Math 120) class at Occidental College (Oxy) in Fall 2012. He was the Head of the Oxy Department of Mathematics at the time.

I think one of Viktor’s strengths is that he guides the students towards a method of solution, but at each turn he reminds them of what they already know in order to apply it (they already “did this”, or made this “u-substitution”) and doesn’t fill in every detail. He assumes they know how to finish the problem, and he lets them do so. This shows a respect for the student and confidence in their ability to use what they’ve already learned. And it allows for the “bigger picture” rather than being involved in too much detail!

He then went to discuss new integrals that might have power reduction formulas associated with them. He built up upon the work they had done in lab (where they had derived the reduction formulas for $\int \sin^n x \, dx$, $\int \cos^n x \, dx$) to more difficult ones involving powers of the secant and tangent, and then combinations of powers of sines and cosines, etc. At each turn, he involved his students in what might ordinarily be a rather dry recitation of formulæ.

One particular student wanted to ask about everything, and Viktor was exceedingly patient as the student went from incorrect guess to incorrect guess.

Nalsey Tinberg

Prof. Nalsey Tinberg observed my Calculus 2 (Math 120) class at Occidental College (Oxy) in Fall 2013.
APPENDIX B. STUDENT EVALUATIONS

In the numeric responses from students I consistently rank above the departmental averages. All of the numeric charts and all of my student teaching evaluations can be accessed at my website by visiting

http://sites.oxy.edu/vgrigoryan/teaching/evals/

Excerpts from some of the students comments appear below, broken by the courses in which they were received.

• Calculus for Life and Social Sciences

  "He always opens the class by answering homework questions, which is very helpful! He also always pauses for questions."

  "I think professor Grigoryan is really good. He presented the material in a well organized manner. Always prepared to work and willing to answer questions. He would try to make sure everyone understood. Otherwise, he would go back to the concept and explain it again."

  "I think he had a good agenda everyday and thoroughly explained the tough problems. He was sarcastic but great, I enjoyed his personality. I wish he had put up sections like 8.4, 7.3, etc. while teaching."

  "Mr. Grigoryan was an exceptional teacher: the determined mastery of skills in instructing. He should definitely tell more jokes, because his sense of humor was hilarious. He was always available to answer questions that students had."

  "He was always nice to all students and had a fun way about him that made class enjoyable. Did not try to trick us with overly difficult questions. Poked fun at himself & overall an excellent instructor."

  "Great in terms of preparation for lecture, helpful in answering questions. I think he’s pretty hilarious sometimes which makes class fun. You learn everything you need to know in class. He’s clear + fair. I pretty much love him. When he talks about anything other than math he shows a little personality & I love it."
I think he was a great teacher. He was very clear and concise, explaining things very well and visually. Grigoryan used humor and kept me involved in the class.

Tremendously respectful toward helping students, assuring the material is understood. Applies theory to practical examples that allows concepts to be retained.

- **Calculus I, II**

  Very good overall, prepared well thought out examples. I love the curves!

  The lecture was really relevant to the homework and tests. I thought we learned some pretty cool things. Thanks for always answering our questions too during lecture.

  Always made sure class understood each step. It was up to the students to ask questions. ... Gave us every resource to pass.

  The teacher had a solid understanding of the material, but also taught it so that the students could understand. The flexibility to take time to answer my homework/test related problems was very valuable.

  Excellent instructor. I hope he stays at Oxy for a while.

  Very good at listening to student suggestions. Asked for plenty of feedback & changes his style to adjust to the responses.
Very clear explanations, very concise and methodical teaching style, and consistent willingness to explain, while not merely doing the work for us.

He was very clear in his explanations and obviously knew his Calculus. He is also very funny at times and is motivational. ... I learned how to think analytically and to understand concepts as best as I can.

- **Multivariable Calculus**

  Good teaching style, made things quite clear. Very amusing person who made class a bit more fun because of his personality.

  Viktor was a brilliant teacher... He presented lots of good examples, and he gave lots of explanations of physical analogies of hard-to-visualize surfaces.

  Viktor was AMAZING! Hands down the best math prof I’ve had here! ... He made class as interesting as possible and even mildly enjoyable.

  He engages the students in his lectures, answers questions completely, and honestly desires his students to do well. GREAT GREAT GREAT PROFESSOR!

  I liked how he made us imagine all the 3-d images and would make the class feel like a discussion rather than a one-sided lecture.

  He related all the concepts to relevant things in real life well.
As a physics major who was/is bad at math, Viktor is by far the best math professor I’ve had. He was able to communicate concepts both visually and mathematically with complete clarity. He expects a lot of us students, but he was always available and capable of answering questions. Viktor is a Stud!

Teacher taught very well and placed an importance on learning “why” the math was the way it was.

**Linear Algebra**

I didn’t like math until taking this course. So, thank you for making this class enjoyable!

This class was extremely helpful. Helped develop my working habits and study skills.

Handouts were very helpful. Quizzes were a good way to see where we stand.

Detailed examples, class explanations. Overall, great teacher. I learned a lot from the handouts.

The feedback on homework/exams was really helpful, I think the quizzes were the biggest plus with this course.
• **Transition to Higher Mathematics (Intro to Proofs)**

  "Very approachable and makes an effort to put things in relatable terms."

  "Enthusiastic about material, goes outside of curriculum to give a more broad understanding."

  "Great prof., always on time, willing to explain any questions. Moves at a good pace and has good attitude towards students."

• **Real Analysis**

  "Really nice guy. Explains things very well and really wants his students to understand the material. Lectures are always clear and he is always willing to answer any questions. I have taken several classes with him and would definitely recommend him to a friend. Great teacher!!"

  "This is my 3rd quarter with Grigoryan and he’s clear, effective and very aware of the students’ comprehension of the material. I would say that Grigoryan listened to students a bit too much and should have probably posted more material. Overall, a great job."

  "He comes to class very well prepared. He can answer questions to the best of his abilities without hesitation and can describe the same fact in numerous different ways."

  "The instructor was very articulate and presented lecture with great clarity."
• Differential Equations and Dynamical Systems

Excellent professor. Very good at explaining things clearly and answering questions. I really like how calm and collected he acts. It makes asking questions and listening to lectures a lot easier. One of my favorite professors at UCSB.


I felt (positively) challenged in this course but not too much that I found the course exceptionally difficult. All of this felt possible with your teaching and clarity. I appreciate it & look forward to next quarter.

Amazing. Well organized, so nice and calm when it came to questions, neat and legible handwriting. When presenting material was always clear in the applications of what we were doing. Incredibly approachable and always responded to e-mails. Best attitude and learning style I have experienced.

Grigoryan is really good at answering questions in a way that is easy to understand. I like how calm he acts while teaching and he is really good about being clear with his explanations. Very nice professor. I like him a lot!

Grigoryan is a great professor, he is someone that seems to care for his students to comprehend the material and not just passing the class by following examples. ... Really enjoyed the lecture “trigonometry and magic”.

... Mild mannered when approached with difficult questions, and just had a great attitude. The homework was graded fairly and was a decent amount every week. Also, the homework definitely made us practice every single thing we learned in the course. His handwriting on the board was very neat.

When it comes to lectures I have only one word: stunning. Simply stunning. I enjoyed how the lectures were very in depth, giving the students the option to pursue deeper into the subject.
Excellent professor. Very good at explaining things clearly and answering questions. I really like how calm and collected he acts. It makes asking questions and listening to lectures a lot easier. One of my favorite professors at UCSB.

Very good at explaining problems and answered questions very well. Thought the grading was very fair and had an enthusiastic attitude in class. Maybe schedule office hours at varied times if possible. Enjoyed the computer visuals.

**Partial Differential Equations**

Professor Grigoryan has outstanding integration of technology into his teaching style. From holding online office hours to providing digital lecture notes. I felt that I always had access to a myriad of resources.

The most organized professor I have had at UCSB. Very clear lectures and always willing to help. Wish he would teach any Math class I ever take.

Awesome! Lectures are very personal and conducive to learning. A nice thing was nice, typeset lecture notes online to supplement (read: replace) the textbook.

Wonderfully detailed lecture notes online were very helpful. I used them more than the textbook.... I would have gladly paid more $ for them than the textbook.

Online office hours worked better than I expected and it was nice to have office hours late in the day as I have classes during almost all my other teachers’ office hours. Thank you for a great quarter.

Knows how to answer hard questions. E-mail questions/answers are helpful. Connection with physics is helpful.
Grigoryan is an excellent teacher. He explains everything from the framework of intuitive reasoning, even the more rigorous, sometimes abstract proofs and principles. The man clearly knows the material very well and is quite capable of answering the most absurd & difficult questions.

Viktor did an amazing job. This has been my favorite class since I started at UCSB, and I am very excited for the 2nd quarter. The only problems were that $\xi$ and $\eta$ are a pain to write, and that it is only a two course series instead of twelve.

The lectures are fantastic. The professor is able to spark the student’s interest in the subject. ... The professor is hilarious and knows the subject extremely well.

This class was difficult, but not to the point of frustration, just to the point where I learned a lot and got a good understanding of the concepts. He is a wonderful professor, and I’m sorry to see the end of this class.

His lecture is excellent because he always explains why the functions come up. He uses graphs (visualizes) what’s going on with the equations. Also, he shows practical uses of equations for engineering or physics.

Excellent use of class time (and consistently so). Always coherent and organized lectures, which gave me time to actually work/study the material rather than reassemble lecture material at home.

Do not change anything: notes, homework or lectures. I felt like my tuition, time and effort has really paid off in your class.