Math 272, Spring 2022 Syllabus

Course Title: Math 272, Applied Mathematics for Chemists II

Instructor: Colin Roberts, robertsp@rams.colostate.edu

Time/Location: MTWF, 8:00-8:50 am, Wagar 107.

Office Hours: Tuesday 10:00 - 11:00 am, 4:00-4:30 pm. Thursday 10:00 - 10:30 am.

Teaching Assistants: Audrey Alspach & Bali Summers.

Teaching Assistant Help Hours: TBD.

Textbooks: These are **NOT** required. My notes will be sufficient!

- *The Chemistry Maths Book* - 2nd Edition, Erich Steiner
- *Mathematics for Physical Chemistry: Opening Doors* - D. A. McQuarrie

Talk to me for options in obtaining both of these texts for the lowest prices if you do wish to purchase them.

Content: Over the next year we will cover the mathematics necessary for upper-level chemistry courses, particularly physical chemistry. The fall semester will be roughly split into three main parts:

- *Calculus in higher dimensions.* Curves and surfaces, scalar and vector fields, differentiation, integration, coordinate systems, and parameterization.
- *Partial Differential Equations (PDEs).* Boundary value problems, time dependent problems, Laplace/Poisson/heat/wave equations, Maxwell's and Schrödinger's equations, and harmonics.
- *Introductory Fourier analysis.* Functional inner products, linear operators, orthogonal functions, Fourier series/transform and applications to PDEs and chemistry.

Grading: Letter grades will correspond to 10% windows: 90-100% is an A, 80-89% is a B, etc. The following items will contribute to your final grade.

- Homework (35%) - Homeworks will be given most weeks. Solutions will be graded on correctness and clarity of supporting work. For example, complete sentences are expected. Assignments will need to be scanned and submitted on Canvas as a PDF file.
- Homework Presentations (10%) - After submitting homework, you will be able to read through my solutions and compare them to your own. Then, as a random group of 3-4 students, you will present the solution to a problem or two to the class. It would be wonderful to mention what you learned, what mistakes you may have made, and what may still be confusing you!
- Applications (10%) - Roughly every week an individual student will lead a discussion on Canvas. The student will choose a topic of their choice. The topic should be an application of the mathematics we cover in 271 or 272 to a specific area of interest.

- Oral Exams (25%) - There will be three oral exams in this class. These exams will be given in a one-on-one virtual environment and run approximately 15 minutes. Alongside me, each of you will discuss the content with me as well as work to solve problems. Problems will be given ahead of time and you may work with others to get solutions. Solutions will be submitted individually and discussed during a set time. *Please make sure that you will have a way to at least vocally communicate with me or we will need to consider an exception.*

- Project (10%) - The last week of class will consist of working on a short project about a special topic. We will solve for the states of an electron in the hydrogen atom.

Academic Integrity: Don't cheat. Check out `http://tilt.colostate.edu/integrity` for more details. While many things in life operate on the "better to ask forgiveness than permission" principle, this is not one of them. When in doubt, ask me ahead of time.

Groupwork on homework, unless specified otherwise, is *not* considered cheating in this class, and is very strongly *encouraged*. However, you are expected to write up your solutions individually; word-for-word reproductions look fishy at best, so please make sure to write things in your own words.

SDC: Have a Resources for Disabled Students (RDS) situation? No problem; just let me know as soon as possible.

Homework:

- Homework must be scanned (or typed) as a single PDF file and submitted to Canvas under the proper assignment.

- No late homework will be accepted. Homework must be turned in prior to the specified time.

Schedule Conflicts: If you need to miss quizzes or exams for any scheduled reason, you must contact me ahead of time (two weeks) and we will make new arrangements.

Other Expectations: Treat your classmates and me with respect. Homework that is not written legibly will not be graded.

Leftovers: Extra stuff that didn't fit any of the categories above:

- As always, your health comes first. If you are feeling sick, take care of yourself first.

- As the instructor, I reserve the right to alter this syllabus at any time. I'll announce any such changes in class, in as timely a manner as possible.

- If you have any issues at all, please do not hesitate to contact me. Pretty much every problem can be resolved via communication.

- Technology is a double-edged sword in learning mathematics. You should attempt to use technology to enhance your understanding without using it as a crutch. Wolfram Alpha, Desmos, and Geogebra can all be very useful.

- Related to the above, patience is your biggest ally. You will get stumped from time to time. Resist the urge to immediately ask for help or to right away Google the answer. Instead, try different things; see what you can do with the

tools given. The process of exploring questions and actively struggling with them will be the most helpful aspect of the class.

Important information for students:

Masks are required inside university buildings. You must also meet university vaccine or exemption requirements.

All students are expected and required to report to the COVID Reporter (`https://covid.colostate.edu/reporter/`) when:

You suspect you have symptoms of COVID, regardless of whether or not you are vaccinated and even if your symptoms are mild You have tested positive for COVID through a non-CSU testing site, such as home test or test at a pharmacy You believe you may have been exposed to COVID go to the COVID Reporter and follow the guidance under "I believe I have been in close contact with someone who has COVID-19." This guidance will depend upon your individual circumstances

You will not be penalized in any way for reporting symptoms or concerns.

Do not ask me as your instructor to report for you. It is your responsibility to report through the COVID Reporter promptly.

As your instructor I may not ask you about vaccination status or if you have COVID but you may freely volunteer to send me information from a public health official if you have been asked to isolate or quarantine.

When you complete the COVID Reporter, the CSU Public Health office is notified. Once notified, that office will contact you and, depending upon each situation, will conduct contact tracing, initiate any necessary public health requirements and notify you if you need to take any steps.

If you do not have internet access to fill out the online COVID-19 Reporter, please call (970) 491-4600.

For the latest information about the University's COVID resources and information, including FAQs about the spring semester, please visit the CSU COVID-19 site `https://covid.colostate.edu/`.