Grad-school track in applied mathematics

1. AUDIENCE

This *informal* track is for undergraduate students who are considering applying to PhD programs in applied mathematics. The recommendations below should also be useful to those considering a masters program in math, either at UVM or elsewhere; those considering the Accelerated Masters Program at UVM; those who plan to apply to PhD programs in closely related fields such as engineering or the biomedical, physical, biological or social sciences; or those who just love math and want to be ready for advanced courses as soon as possible.

Note:
(1) All recommendations below apply to students in one of the categories above. Also note that these are only recommendations, to get your degree, you need only satisfy the relevant University requirements and the requirements of your program.
(2) Please check with your math advisor before finalizing your schedule. Different students will have different needs.

2. STRONGLY RECOMMENDED COURSES

We strongly recommend that students take Math 230, Ordinary Differential Equations, as soon as possible as soon as Math 121 (Calculus III) and Math 122/124 (Linear Algebra) have been completed. Math 230 is a prerequisite for a large number of applied math courses; taking it relatively early will open up many options.

The analysis sequence consists of Math 241 and 242. Math 241 is offered every fall and in the spring in alternation with Math 251. Math 242 is offered every spring. While Math 242 is not required for the degree, it is an important foundational course for a number of graduate-level courses in applied mathematics. It is recommended for all students interested in graduate school in a mathematics-related discipline and is strongly recommended for those interested in PhD program.

2.1. **Other suggested courses.** There are a number of non-required courses that are really useful to take. A few notable ones:

- Mathematical Models & Analysis (Math 235; Spring).
- Numerical Analysis (Math 237; Fall).
- Chaos, Fractals & Dynamical Systems (Math 266; Spring).
- Mathematical Biology & Ecology (Math 268; Spring).
- Applied Analysis (Math 272).
- Principles of Complex Systems (Math 300; Fall).
- Complex Analysis (currently Math 295; Fall).
- Advanced Ordinary Differential Equations (Math 330; Fall).
- Probability Theory (Stat 251; Fall). Note that either Stat 151/153 is recommended as a prior course.
- Data Science I (Stat 287; Fall).

Sufficiently prepared undergraduate are welcome in graduate courses. Offerings vary from year to year and we encourage you to talk directly with your advisor or instructor in an upper-level course to help choose the best options.

2.2. **Undergraduate research.** We highly recommend you participate in some form of undergraduate research, if at all possible. There are many advantages to participating in undergraduate research. Primarily, you will get a much richer appreciation for what mathematics is and what it means to discover new mathematics. But there are many possible secondary benefits as well such as getting to know a faculty member better.

If a professor agrees to work with you on a project, you can arrange to sign up for Math 293/294 for credit, just as you would with a traditional course.

Read here and here for more information on undergraduate research opportunities both at UVM and elsewhere.

2.3. **Suggested yearly plan.** Below we list some suggested plans for students with different levels of preparation upon starting at UVM. While we list specific courses for concreteness, note that there is a wide variety of options for the non-required courses. You are strongly encouraged to explore options with your advisor, professors and fellow students.

If you begin your first year at UVM with Math 021, the following is a good option. Asterisks indicate courses specifically required for the BS in Mathematical Sciences, Majoring in Mathematics:

Year	Fall	Spring
First	021*, CS 021*	022*, 052*
Second	121*, 124*	230, STAT 141
Third	241*, 251*	242, STAT 151
Fourth	STAT 251, 295, 237	272, 294

If you have AP credit and start in Math 022, you might do something like the following:

Year	Fall	Spring
First	022*, CS 021*	121*, 052*
Second	124*, STAT 151	230, Stat 251
Third	241*, 237	242, 300
Fourth	251*, 295 (Complex Analysis)	272, 235/268

If you have AP credit and start in Math 121, you might do something like the following:

Year	Fall	Spring
First	121*, CS 021*	124*, 052*
Second	230, STAT 151	266/300, STAT 251
Third	241*, 237	242, 235/268
Fourth	251*, 295 (Complex Analysis)	272, 337/339