

MATH 2208: ORDINARY DIFFERENTIAL EQUATIONS

PREREQUISITE TOPICS

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Differential, integral, and multivariable calculus, and linear algebra are the prerequisite courses for this class. It is normal to forget things from previous classes. Indeed, at this stage, I am not expecting you to be able to recall everything from those classes. However, you will need many prerequisite topics for this class, and **I do expect you to take time to refresh your memory on the prerequisite topics**. If you do not, it will be a significant barrier to you learning ODEs.

To reduce the number of items you need to review (in your own time), I have made a list of prerequisite topics that will come up in this course. I also indicate when (roughly) these ideas will come up, so you don't have to review everything at once.

In the list below, I refer to “elementary functions”, by which I mean:

Elementary Functions: polynomials, exponentials, natural logarithms, sine, cosine, tangent, roots

■ Precalculus (by week 1)

- Knowing how to graph the elementary functions and rational functions
- Doing algebra with the elementary functions (e.g. recalling rules how to manipulate logarithms)
- The absolute value function

■ Differential Calculus

- Differentiating the elementary functions (by week 1)
- Basic differentiation rules, e.g. simplifying $\frac{d}{dx}[f(x) + g(x)]$ and $\frac{d}{dx}[cf(x)]$ (by week 1)
- Product and chain rule (by week 2)
- Optimization problems (finding local and absolute maximums and minimums) (by week 8)
- L'Hospital's rule (by week 1)

■ Integral Calculus

- Integrating the elementary functions (definite and indefinite) (by week 1)
- Basic integration rules, e.g. simplifying $\int [f(x) + g(x)]dx$ and $\int cf(x)dx$ (by week 1)
- Integration by parts, u-substitution, partial fraction methods (by week 1)
- Taylor Series (by week 4)

■ Multivariable Calculus

- Parametrization of the circle (by week 2)
- Partial derivatives (by week 2)
- Parametric plots of functions (by week 3)

■ Linear Algebra (after the first exam, roughly in week 6)

- Drawing vectors in the plane
- Basis vectors
- Linear independence of vectors
- Solving a 2×2 system of linear algebraic equations
- Matrix multiplication
- Computing the determinant of a 2×2 matrix
- Computing eigenvalues, eigenvectors, and eigenspaces of a 2×2 matrix
- Definition of a singular matrix