1 Resources

1.1 Textbook

- Hassani, *Mathematical Methods For Students of Physics and Related Fields*, 2009, Springer

1.2 Books to have handy for review

- Your favorite calculus book. There are a gazillion calculus books out there, so pick one you like. Since I can't possibly provide references to every calculus book, I'll give you section references to two that are easily obtained by TTU students:
  - If you took calculus at TTU, you probably have: (SST) Smith, Strauss, and Toda, *Calculus*, 2014, Kendall Hunt.
  - A series of top-quality calculus books freely distributed online is: (OSTXC) OpenStax, *Calculus*. You can download PDFs or apps.
    - Volume 1: https://openstax.org/details/books/calculus-volume-1
    - Volume 2: https://openstax.org/details/books/calculus-volume-2
    - Volume 3: https://openstax.org/details/books/calculus-volume-3
- Your favorite intro physics book.
  - If you took intro physics at TTU, you probably have: (SJP) Serway and Jewett, *Physics for Scientists and Engineers*, 2008, Thomson/Brooks/Cole.
  - A series of intro physics books freely distributed online is: (OSTXP) OpenStax, *University Physics*. You can download PDFs or apps.
    - Volume 1: https://openstax.org/details/books/university-physics-volume-1
    - Volume 2: https://openstax.org/details/books/university-physics-volume-2
    - Volume 3: https://openstax.org/details/books/university-physics-volume-3
  - A classic available freely online is (FLP) Feynman, Leighton, and Sands, *The Feynman Lectures on Physics*, online edition: https://www.feynmanlectures.caltech.edu/

1.3 Math reference handbook

Nobody can remember everything, so make yourself familiar with a good repository of mathematical knowledge.

- (DLMF) Olver (ed), *NIST digital library of mathematical functions*
  - Available online at https://dlmf.nist.gov/
  - This is an online edition of the hardcopy book *NIST Handbook of Mathematical Functions*, 2010, Cambridge.
- The original NIST (then NBS) *Handbook of Mathematical Functions*, edited by Abramowitz and Stegun, was published in 1964. It is now freely available in PDF form. There's an inexpensive Dover version if you like hardcopy.

1.4 Related books

- Boyce and DiPrima, *Elementary Differential Equations and Boundary Value Problems* is the classic undergraduate text on differential equations. You can probably find a used copy of an earlier edition at Amazon or other used bookseller.
- If you're looking for other books at about the level of this course, here are a few:
  - Boas, *Mathematical Methods in the Physical Sciences* is another standard undergraduate Math Methods of Physics text
  - Arfken and Weber, *Mathematical Methods for Physicists* is at about the same mathematical level as this course, with lots of problems and examples. However, the discussion assumes you know physics at about the senior level.
  - Tang's three-volume series *Mathematical Methods for Engineers and Scientists* is good.
- If you really like this subject, more advanced books include:
  - Hassani, *Mathematical Physics*
  - Cahill, *Physical Mathematics*
  - Byron and Fuller, *Mathematics of Classical and Quantum Physics.* This is available as a Dover reprint.
  - Morse and Feshbach, *Methods of Theoretical Physics.*
  - Bamberg and Sternberg, *A Course in Mathematics for Students of Physics*, a two-volume set. This isn't a "math methods" book; it covers fundamental mathematics (linear algebra, real analysis, differential geometry, and algebraic topology) aimed at applications to physics.

1.5 Online presentations

- **3Blue1Brown** video series by Grant Sanderson. These are wonderful. Some series of particular relvance to this course are:
  - Calculus: https://www.3blue1brown.com/topics/calculus
  - Linear algebra: https://www.3blue1brown.com/topics/linear-algebra
  - Differential equations: https://www.3blue1brown.com/topics/differential-equations
  - Fourier analysis, vector calculus: in https://www.3blue1brown.com/topics/analysis
- **MIT OpenCourseWare** has courses on many subjects. Relevant to this course are:
  - Differential equations: MIT 18.03
  - Linear algebra: MIT 18.06
  - Multivariable calculus MIT 18.02