

Online Seminar on Undergraduate Mathematics Education

Making linear algebra student-friendly by re-ordering the topics and adapting the tone

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Linear Algebra is often an obstacle for students whose only prior experience is with calculus. I discuss a textbook I'm writing that takes a very different approach from existing textbooks. The target audience is ordinary students, not honors students. A key organizing principle is for the course to have a narrative arc, with near term and longer-term goals pointing the way forward at each stage. The arc for the first part of the course focuses on diagonalization, first for the 2×2 case, and then using the $n \times n$ case as motivation for concepts like linear independence. Another important organizing principle is to introduce a concept only when it is necessary for the arc—for example, the transpose of a matrix isn't introduced until chapter 18—and then to give the students an intensive experience of using the concept. Proofs are a basic part of the course, and most homework problems are proofs; however, the usual emphasis on formal language is avoided (set theoretic language isn't used until chapter 16 and quantifiers are never used) without loss of mathematical correctness. The approach is both student-friendly and mathematically rich.



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