

GILBERT

Hi, I'm Gilbert Strang, and professor of mathematics at MIT. And I get a chance to say a few words about 18.06, Linear Algebra. It's one of the basic math courses. Can I say a little about linear algebra itself?

STRANG:

Classes in linear algebra earlier years tended to be pretty much for pure math majors, and a lot of proofs, and usefulness of the subject kind of wasn't so clear. Whereas, it's an incredibly useful subject.

Data is coming in all the time. We're in the century of data, and data tends to come in a matrix, in a rectangular array of numbers. And how to understand that data is a giant, giant problem. And people use matrices in solving differential equations in economics, everywhere. So the subject had to change to bring out this important aspect, that it's terrifically useful.

Often networks are a great model, where you have like-- like the internet. Every website would be like a node in the network. And if one website is linked to another one, there would maybe be an edge in that network. So that's a network with a billion nodes.

And a matrix describes all those links. Like when Google produces a PageRank, you enter-- well, you could enter linear algebra, and see what happens. I don't know. I hope something good. Well, anyway, thousands and millions of stuff would come up ranked in order, and that order comes from operating-- Google's very fast at it, very good at it-- operating on that giant matrix that describes the internet.

OK, so a word about the course itself-- the MIT course. First of all, there will be students coming from all the departments. That includes management. Business data comes in matrix form just the way engineering data comes. So there is hardly a prerequisite for the course. There's no big reason why calculus has to come first.

Probably most MIT students will know before the course starts-- they will have multiplied a matrix by a vector, or multiplied two matrices. So they've at least seen matrices before. But anybody could catch up on that quickly.

And then, the course just takes off. Actually, we go back to ask, how do you understand multiplying a matrix by a vector? A key-- yeah, you guys will probably know how to do it, but let me say it another way-- A matrix times a vector produces a combination of the columns in that

matrix, those column vectors in the matrix. So that's like the key step in linear algebra. What you can do with vectors is take linear combinations.

Well, at MIT, the course is organized with three lectures a week. And I use the chalkboard. I hope you feel, in watching them, that that's OK. The nice thing about a chalkboard is you get to see-- what's written doesn't disappear. So your eye can continually check back and see how does it connect with what's happening at the moment.

And then, there is one hour a week of recitation. Because that's a smaller class, it just means there's a teaching assistant there, who can help with problems, suggest new problems. It can be a problem-based hour, where my lectures are more explanation hours.

So about the textbook. The homeworks come from the book mostly. Sometimes we add MATLAB problems, sort of specially constructed ones. But the central ideas of the subject are described in each section of the book, and then, naturally, exercises to practice with those ideas.

And then, the neat thing about 18.06 Scholar is you get short lectures, short videos, from six different TAs, did about six problem-solving videos each. And they are neat. The TAs are good. And that's something that can happen in the recitation with a smaller group. There's chance for a discussion, whereas in the lecture-- well, I still ask questions in the lecture, as you'll probably see. But it's a little harder for students to shout out an answer, so they can shout all they want in their recitations.

With each lecture, we produce a written summary of what it's about. So after you watch the lecture, you could look at that summary and it reinforces, remembering the key points of the lecture. And then we also added in some problems, four or five problems from the book that you can just look at and see, OK, do I know what the question is here? Do I know how to do it? I think, as a result, you're learning linear algebra.

A thought or two about linear algebra worldwide, because it really is worldwide. The feedback comes from all over the world. It's really nice to get. Also, I enjoy going. So if somebody invites me to Egypt or Australia or China, I tend to go if I can. Because that's a lovely part about mathematics. It's really universal. It's a language almost of its own that everybody can learn to speak. And I hope these lectures help.