1 Overall evaluation

Overall rating
Mean rating: 6.65

Prep hours
Mean rating: 3.92

Class hours
Mean rating: 3.06

Readings comments
Class notes are very helpful and thorough, I cannot wait for a book to be published.

readings were good reference

The textbook was being written as we went to class; I think it would have been helpful to actually have a printed book, and to have the postings go up faster, but they were pretty good.

No such things.

The professor wrote notes after every lecture that he put on the course website, and they were EXTREMELY helpful when doing the problem sets.

The online class notes were very helpful! They were also good for reinforcing stuff from class, as well as when I had to miss lecture.

Class notes reflect most of what we see in class (and clarify issues that might have come up later), but you wouldn't understand them if you weren't in class on the first place. To be honest, although I read them, they didn't provide anything new.

The class notes were not as good as the lecture. Sanjoy's enthusiasm and excitement cannot be supplemented by simply reading the material

The class notes are useful.

Excellent Notes from the teacher!

No textbook. Excellent notes that will soon become a book. Very well organized and followed the lectures closely. Somewhat helpful in doing the homework problems.

Very well done, especially with how the professor added to the notes as we covered material in the course of the class.

The professor is writing a book, and should be a great resource.

Class notes excellent and useful for reference on problem sets.

Class notes are vital for solving homework, notes are also placed online and are helpful. Class notes are essentially parts of the textbook uploaded online.

The professor is planning to publish the class notes. They are very good–you can learn the material in class from the book, but you miss the good lecturing.

notes are very useful

The notes were very polished and extremely useful. They reflected the class material perfectly and were very well written.

Online textbook like notes.

The notes are good. I'm sure I will continue to refer to them years later.

The class notes are written by Professor Sanjoy and are excellent.

the class notes were a great resource

The class notes were useful in filling up some of the gaps in my note taking.

The class notes and Sanjoy's notes were very useful.

The professor is writing a textbook; the chapters of said book formed the class notes. I didn't find them to be terribly useful for learning the material, largely because I learned it effectively from lecture. I did use the book as a reference, particularly for material that I hadn't learned before; it wasn't really optimal for this, though.

Class notes were great. Prof. Mahajan is supposed to turn them into a book soon. That will be a great asset.

Diff rating

Mean rating: 3.23

Suggestions

I think there was a lot more group work at the beginning which sort of fizzled away. It would be nice to keep that up. Also, I think everyone in the class wishes there was a way to retain the random information that Sanjoy knows.

take notes from sanjoys teaching methods!

I think it really would be helpful for the book to be out so students can read about methods beforehand.

Aaaah! That's too much.

Continue with this format. I liked it and I feel like I learned a lot.

A much longer section or warmups in the psets would be very useful. Also, it would be nice to change strategy everyday, or change something every class. I missed a couple of classes and somehow felt I hadn't missed much. It would have been nice to know that you're missing something critical if you don't come to class one day.

i only like sanjoy!

Maybe a 1.5 hours lecture twice a week will be better than 1 hour 3 times a week !

Teach it the same way it has been taught now by Sanjoy Mahajan.

There were too many people in the class this year.

I wish there were little more follow-through on some of the examples. Perhaps, it can be shown how approximation can be refined and used in design, or double check to what extent certain assumptions were valid.

Keep up the great work, I'm really happy and excited to take more coures from you him in the future. He's a great asset to MIT and I'm glad that MIT gives him the freedom to teach unorthodox courses such as this one.

Get a TA so that we can get our psets back to us with comments.

Maybe a little more organization re: homework, or a slightly more specific grading system. 'I don't like to worry about grades, I like to worry about learning' is an excellent philosophy until our GPA's determine grad-school admission...

No

Motivation

Seemed like a fun elective and it was!

the prof is amazing

I took this subject because I thought it would help me get my head around back of the envelope calculations I think it has helped, and maybe with practice I will become better.

Right-brain thinking is key.

I took this subject because I needed credit and it sounded easy. This is a good subject to take because it covers a wide range of approximation strategies that any engineer can use.

I wanted to take a fun class.

I took this subject because I wanted to learn how see problems as a big picture. I was also curious to see how I would be able to solve problems on topics that are completely unknown to me (like quantum mechanics). It is a pretty light class (it should probably be 9 credits –at least for grads), but mentally challenging. It is the simplest problems that will keep your brain busy most of the week.

I took this course after attending the great IAP class from the same instructor (street fighting mathematics). Sanjoy puts a lot of effort in preparing stimulating lectures and each class shows it.

It was a new class that would be an elective for me. I also heard good things about the professor. This is my favorite class for all four years. I went to every class because I didn't want to miss them. I would tell anyone wanting to take the course to not miss a lecture. And if possible, go to any seminar that the professor recommends.

Teach you how to think in a smart way and make you a better engineer. This class should be a strongly recommended class for all MIT engineering students

I understand the value of approximations, and I wanted to learn and practice as many useful techniques as possible. Everyone should take this class.

To gain skills in problem solving.

I took it to learn ways to quickly perform back of the envelope calculations, and I really learned a lot. The instructor was fantastic, and did a great job of incorporating ideas from many fields, answering questions, seeking feedback, and giving good explanations.

It sounded interesting (it was).

Curiosity.

It sounded like an awesome class from the description, being able to approximate how much fuel a jet plane would use etc., and also the skill of approximation is a very useful one to have. Advice would be to take it seriously because it can be very useful.

Sounded cool. Someone should take the subject if they want to change they way they approach hard problems and learn a real-world method to get answers quickly.

took IAP version few years back, most useful class I've had at MIT

I took this class because I heard great things about it and I was able to secure it as a course 6 elective.

Mostly interest. I wanted to see the teaching method used in this class. It was essentially an overview of how to start a problem.

I came into one lecture, loved it, and kept coming.

I took the class because I wanted to learn about mathematical methods of aproximation. In reality this subject is about how to some really complex problems easily. Although not what I expected the class turned out to be fantastic. People should take this subject so that they can see how many different ways there are to look at problems that at first seem difficult if not impossible.

i thought it would bolster my problem solving skills, and help me in my mechanical engineering courses

From speaking and hearing lectures from various sources, they told me the importance of back of the envelope calculations and approximation to solve problems. I wanted to lear about this in a structured way.

I'm graduating so I wanted to get an opportunity to improve my problem solving skills.

It looked like an interesting subject, and it was recommended to me by two people independently. Also, it was cross-registered in Courses 2 and 6; and I'm considering a Course 2 minor.

I saw that the class description said there would be examples from various field including computer science and biomedical engineering, which I'm going to grad school for.

Subject info

Although it might seem fluffy, learning approximation techniques is very helpful and powerful.

Very powerful skills on how to approach problem solving, rapidly analyze phenomena and explain the phenomena analytically. Class is peppered with in class examples which were very helpful.

In this subject you learn methods and approaches for approximation and you apply these approaches to interesting problems. This class helps you tie information together from different sources. I think the class will be better when the textbook is finished so you can read ahead and come in prepared to ask interesting questions. I think the class was a little oversubscribed, but it was nice to have people from a variety of backgrounds.

A little about a lot.

The main idea of the subject is how to solve problems easily if you don't mind that the answer isn't 100% correct (although, as we learned, a lot of times it is very close). Various approximation strategies were covered and examples were drawn from a diverse array of fields. One day we might be talking about the physics of a black hole and the next we will learn about the relationship between the size of an animal and how high it can jump.

I found this class very interesting, and I learned alot about how to apply information and techniques I had learned in other classes but could never remember or make sue of. The problem sets were always helpful in reinforcing stuff from lecture, and the examples were generally interesting.

You learn how to attack problems on topics you know barely nothing. You learn to have common sense. Yes, the subject matched my expectations. The balance between application and theory is critical, the purpose of the class to learn how to deal with this balance. Strong points: it puts everyone –freshmen, seniors, grads– at the same level, and allows us all to contribute with our knowledge to solve a problem in different ways. Weak point: The problems on the problem sets sometimes aren't repetitive enough for some strategies to stick to your mind.

Amazing class! The instructor is excellent; the course spans many different disciplines and various physical aspects. Also, the approach, based on approximating results of complex problems, is a mind-opener. A great engineer is one who can quickly guesstimate the results before plunging in solving differential equations or mathematical models

I learned many ways to break down problems, including problems that I have know prior knowledge about. I also became more genuinely interested in learning. I'm sad that I couldn't have taken this class earlier in my academic career.

Excellent Content! One of the best Classes I have taken in my life !! Brilliant teacher

I learned much about the world. Solving complicated problems does not have to be difficult. I left the course with a powerful toolbox of approximation techniques that can help me to understand the world.

I learned a lot and feel that the class may be the best class for real life engineering applications that I have taken at MIT.

You learn great ways to approximate many things. It was a fantastic course, and I feel like I learned a lot! There was a great balance between discussing exact methods and showing how you can get close with simple approximations.

I learned a lot of techniques for approximating answers to a variety of real-life problems, many of which require high-level calculations for an exact answer.

Interesting lessons with wide applicability in the real world, most useful in showing that daily occurrences are susceptible to analysis by quantitative methods.

I learned a lot about approximation, when to approximate, and how to approximate. The class is very well balanced, there is theory and there are examples and real life applications. The subject is very rich in content, and the content doesn't really get old because even though it's on the same topic, it involves radically different approaches which make it interesting.

You learn how to solve hard problems in an easy way. The subject's content exceeded my expectations– I thought I would just learn how to approximate useless things like market sizes, but I learned

about physics, material science, astronomy, music, and so many other subject areas. Moreover I learned how to apply what I learned to any hard problem in whatever field.

approximation is extremely useful in engineering

This class literally changes the way you view the world. Everywhere you go, you begin to break up objects into smaller pieces or devise estimation methods for solving everyday tasks.

The course essentially deals with ways to make first order, or order of magnitude type calculations. It fit my expectations.

The most important thing that you learn is a style of problem-solving where you simplify your problem early in the process. This is extremely useful for design engineering. You also learn that many problems have similar answers, so you can't go too wrong by guessing. The theory is application-driven, which is great.

You could learn almost nothing if you don't engage yourself, otherwise you can learn a lot about a huge range of subjects.

very interesting. always balanced between the theory of problem solving and real world problems. very fun questions, that answer many questions that i have about the world, but don't require too complicated math. sometimes, it was hard for me to link everything together though, because the subjects we were going between varied so much. sometimes i thought it was a stretch when he said that they way he solved the problem fell under a specific method of problem solving.

The content matched my expectations. We learn the method of approaching very difficult and complex probelms in a way that simplifies it into a manaeagleable way without calculators

The content was very useful. It did match my expectations, although I would have liked feedback on my psets so that I could improve my problem solving skills.

The goal of this subject was to learn to approximate anything. I think the subject did quite a good job of this. My one concern was that it tended to teach how to approximate things that I didn't already know, or didn't know the origins of (particularly later in the course, when we got into fluid dynamics and quantum mechanics). It wasn't necessary to know these things to understand the class, but it would have made the class more enjoyable.

You learn how to approximate. You learn how to think different, not getting bogged down by detail.

Hot

Sanjoy is awesome and knows everything! Excellent distribution of material and examples for all different disciplines. One of the most interesting classes I have taken at MIT and I would love to sit in on it again.

blazin

This class is fun, and it teaches you how to have fun with science and technology and to get out of the mindset that you have to have really specific knowledge before you can solve general questions, and it helps you learn to take risks.

Interesting topics.

-Cool professor -Not too much work, emphasis is on learning -Skills learned are relevant to any engineer

I loved this class! I liked the demonstrations alot, especially the airplane demonstration.

Class discussions. Everyone in the classroom knows something about each topic –mindblowing. Whenever the professor's assumptions/derivations are flaky, someone will come up with a better way of solving the problem. We all learn.

The lectures! Answering muddy card questions at beginning of class. Sanjoy was a great lecturer

Instructor, approach (thinking about problems)

The professor was able to answer every question without hesitation. He constantly sought direction and made clear every muddy point. We could put any question we wanted on a slip of paper every class and they'd be answered at the beginning of the next class.

Wonderful Class

Sanjoy is one of the best instructors at MIT. Take this class if only to see an MIT professor at his best. Sharp lectures, immense class participation, and VERY useful concepts that can save years of tedious calculating in the course of one's career.

The lecturer, the notes, and the applications covered

Take it, you will love it!

Professor Mahajan

Entertaining examples, demonstrations.

Teacher is amazing and very nice. Very laid back class.

Professor. Demos. Class Notes. Topics.

Estimation and approximation are extremely useful, everyone should take this class

Approximation Prepping for interview questions

It was very helpful to learn through examples. The organization of the class was both clearly presented and repeated.

Everything! Specifically: 1) Organizing the ideas of the class in a tree and consistantly going back to the tree to show where we've been. 2) Sanjoy's presentation 3) Sanjoy being available to answer any question 4) Q&A sheets handed out in class and addressed next class 5) Encourages physical intuition

The variety of problem solving strategies and their applications.

very interesting, will get you thinking about the world again.

Great lecturer, interesting wide ranging topics, very applicable methods and theory

Sanjoy, very good professor and easy to talk to!

Very fun course. Interesting material with many practical day-to-day uses. Professor clearly enjoys teaching.

You learn how to think different. It's fun and the professor is great.

Prereqs

Interest in solving problems.

very little background is required

Useful to have seen a command line interface before and looked at scripts. Even better is to have some background in MechE and/or physics. The prereqs will enable you to do fine in the class and still get something out of it, though.

The professor covers a wide range of subjects as they relate to approximation, from physics to biology to computer science. While he explains each topic well, students should at least have the math and science GIR's under their belts to avoid being left behind.

18.01, 8.01

Curiosity and open mindedness to attack problems on which you know nothing about.

none its a good class to take on the side if it fits your schedule

the way the class is taught, you don't really need any pre-reqs, it just makes it more enjoyable to know more. but at the least, some math and 8.01

Go to class, it's what makes this course worthwhile. Have a basic understanding of freshman physics and math.

An introduction to programming would have been a good prerequisite to add

None are necessary.

none

No real pre-requisites, just motivation and a desire for knowledge and willingness to learn.

Only interest.

basic physics and math, not much more

8.01 and calculus

The examples are very diverse such that no particular scientific background is more helpful than another. In general, mathematics up through differential calculus is helpful. It is almost essential to come to class as there is little opportunity to get the necessary material ouside of class time.

freshmen physics

All you need is a little curiosity.

8.01,

I attended monday and wednesday lectures but as a result of a lab conflict on friday, I had to miss that class. So 2 hours a week in class

8.01 and my mechanical engineering background was useful.

There really are no prerequisites, beyond a solid grasp of high-school math. However, the more random factoids you know (on any subject from fluid mechanics to Linux pipes to the migratory habits of Australian birds), the more you will enjoy this class.

18.01, 8.01

Grading comments

What grading policy?

very fair

Grading is extremely fair.

Fair and progressive, indeed.

Besides saying that the homework will be "graded lightly", the professor hasn't talked about the grading policy much. However, at the beginning of the year, be wrote a paper that he put on the course website about why grades are counterproductive to learning, so I imagine he will be very generous in giving out grades.

As far as I know, it is fair. (I heartily approve of not having exams).

Grading policy is fairly relaxed, as long as you show interest in class and turn in problem sets. Now, it is impossible to be in the classroom and not show interest, and not liking the problem sets would be not to be curious at all –so basically everyone does fine.

i think the grading policy is fair. I was encouraged to learn the material without worrying about my grade in the class it kept me curious

I think it was distributed evenly and fairly.

Very fair and relaxing and makes you motivated to do the homework more for the sake of learning then getting a good grade and eventually you end up with a good grade

The grading policy was unique and appropriate. The focus was to get students to be curious about the world. Grading harshly would only serve to discourage students from becoming curious. Instead, collaboration was encouraged strongly. Reasonable effort gets an A. The grading scheme was very appropriate and fair.

Very good.

It was very fair. He really encouraged learning for the sake of learning and not stressing a curve or competition among students.

Grading is less emphasized than learning, which makes the class lower-stress and leaves more room to learn new things.

Grading seemed to be very fair, though I had no idea what grade i was going to get.

Very easy.

no-worry system, pretty easy

This class has a very open ended grading policy. It's not that everyone will automatically get an A, it's that not worrying about getting a C should encourage you to explore on your own. In this sense, at this point in the term, I do not know what my grade will be, but I'm ok with that.

Great!

Grading policy is established so you don't have to worry about grades, just about the material you are supposed to be learning.

Sanjoy's grading policy I think is more fair than any other grading policy at MIT. It is entirely unfair to place students on a curve and base their grades on exams instead of effort and learning.

P/D/F

The grading policy was extremely lenient. Assignments were generally P/D/F. However, we seldom got grades back (presumably he just didn't bother returning 'P"s, though I don't know that for sure), and P/D/F isn't the most granular scale; so I'm not really sure what sort of final grade I'm likely to get.

Grading was great.

Pset comments

Problem sets were helpful in learning the techniques but I would have wished there was less hand-holding.

helped me to learn material

The problems sets are very useful and fun. They are challenging, but because the goal is to make approximations, they are fun!

Good stuff

Problems on problem set ranged from fairly easy to real head scratchers. I didn't finish every problem, but supposedly they are "graded lightly" on a "made a reasonable effort"/"didn't make a reasonable effort"/"didn't turn in" scale. Problems generally expanded on examples from class. For the most part I did not collaborate. There are no bibles because this is a new class.

The problem sets were very useful in learning the material, and always do-able. I occasionally collaborated with other students in the class.

Problem sets are really entertaining. I wish we could have had more. They were extremely useful, although sometimes repetitive with what we saw in class. I solved them on my own, but then shared results with classmates before turning them in. We'd usually have different results (which, in this class, is completely normal) and would engage into really interesting discussions. No bible needed, brain needed.

Problem sets were rather easy. They were good for exercises, but I learned more from lecture than from the problem sets. The problem sets were not like usual course 6 problem sets where you learn all the tricks and concepts from the problems. The lectures for 6.055 were strong enough for me to understand everything without problem sets. THe problem sets were good for seeing more applications for the material

There are no bibles, and bibles are not necessary. The whole class looked forward to the p-sets and at times were asking for the next one. I sometimes would ask other people their thoughts on some estimates, but I mainly did it to tell more people about the class.

Very Nice, thoughtful, make you think, learn and enjoy science and engineering more and more

Problem sets were very beneficial to learning. The examples were entertaining, useful, and fun. Collaboration was encouraged and it was helpful in learning the material.

Difficult, but allowed mastery of material.

The problem sets were very helpful in helping us understand how to apply the methods, and think of new areas the methods could be used.

Problem sets varied in difficulty, but were generally interesting.

They're very useful, group work is encouraged but only to come to a consensus and not to copy work. No bibles needed.

Very useful to practice. The right length. I rarely collaborated with classmates, but sometimes discussed the problems with people not in the class.

useful for learning, but should have been more regular

The problem sets were well rounded: not too hard, not too easy. The problems were thought out and the notes really helped.

I didn't get a chance to do most of them, but the ones I did seemed to clarify the class material well.

Great problem sets, although I wish I had more time to work on them.

The problem sets are great, but there are not really enough of them to get a lot of practice using the methods you learn in class. To get enough practice you will have to come up with thing to figure out on you own using the methods introduced in class.

they were useful, and i did collaborate, which did help when i got stuck

They were useful and very interesting problems to solve, perhaps the most interesting homework problems I will get at MIT. I collaborated with another student in the class occasionally

The problem sets were useful in applying the techniques that we learned. I did collaborate which helped.

There were a handful of fun and useful problem sets. I didn't collaborate, or use a bible. However, I frequently worked on the problems in the living room of my ILG, and read out the fun ones to other people in the room as I got to them; they enjoyed trying to think them through.

Problem sets were fun, and we were encouraged to collaborate, so I did.

Objectives

Yes.

Absolutely

I thought the objectives were pretty clear.

At the beginning of the term, the professor drew for us a tree showing all the different approximation methods that we would be learning. Periodically throughout the term, he would draw it again to show us where we were.

Yes, the class followed all objectives set initially, and I'm extremely happy with the outcomes.

i enjoyed the tree analogy for the class structure

The objectives were clearly defined and met.

Yes

The course was well defined from the very first lecture. At the beginning and throughout the course, an outline of concepts was presented. Each of these concepts received ample time and

many examples from different subject areas. Knowing what to expect made the material easy to learn. It would be difficult to find a better way to organize and teach such a class.

the emphasis was on learning a variety of techniques to approximate all sorts of things, as well as developing curiosity about the world around us, and this outcome was accomplished for me.

Yes, he provided a roadmap, and followed it well.

Yes. We were presented with an outline that he kept reintroducing and filling in continually through the semester.

yes, pretty close to expectations

Yes

Yes, Yes, and Yes.

The professor provided a clear set of objectives and outcomes at the beginning of every lecture, and the class followid thous objectives very well. I feel very confident about the outcome of the course.

yes, the objectives were set clearly and followed

The professor has a clear outline of the course and followed it

Yes, and he was very good at defining them as the class progressed.

An attempt was made at this; it's not entirely clear to me that we stuck to it perfectly, though. My understanding is that this was the first running of this class; my sense is that this will improve next term.

Yes

Or not

Nothing.

The teacher, Sanjoy, is also pretty cool.

Though this is a course 6 class, very few EE or CS examples of problems were given. As a computer science major, I felt like I was at a distinct disadvantage compared to the MechE's.

Sometimes the assumptions/derivations seem *too* flaky, and one has the feeling that you've been tricked.

everything is great!

Every thing is good!

Nothing.

a couple annoying people in class

Often we did not complete the objectives for a particular class period. Occasionally, the class seemed to get bogged down on a particular example and I left the class feeling like we had just wasted the time period. Often the exploratory nature of the class made a particular example/problem seem arbitrary.

nothing

Some times the lecturer would go a little too fast and loose through examples leaving students a bit bewildered. If he slowed down on some of the nitty gritty of the algebra it might help.

N/A

Wow. . . I'm drawing a blank.

Nothing

2 Lecturer: Sanjoy Mahajan

Comment

Great lecturer, very captivating and knowledgeable. Never gets frazzled by absurd questions that may arise.

outstanding lecturer

Very approachable, made class interactive, Every Question Worth Asking kind of attitude, really encouraging. Basically made solving problems you don't know how to solve fun and approachable, which I think is the object of the class. I can't think of any particular improvements. Perhaps my classmates will come up with some.

Very good. It's obvious that he is part of the Teaching Laboratory.

At the end of every class, he has us fill out a feedback form, then at the beginning of the next class, he will spend maybe 15 minutes addressing them. Uses the blackboard a lot. A lot of times he will give us a problem to think about for a minute or so, then tell us to find a neighbor and share what we got and how we got it. I never really liked talking to my neighbor. Sometimes brings demonstrations to class, which was always fun.

The teaching and boardwork was generally pretty clear.

He's an excellent teacher. Extremely good motivator. Makes things seem so simple. . . He is definitely amongst the best teachers I've had in my three years at MIT. He knows how to deal with freshmen and grad simultaneously without leaving anyone aside, which is impressive. There are a few topics however that he does not understand completely, and he sometimes gives the wrong explanation for a certain problem. Usually someone in class will jump, contribute and the issue will be cleared out, but I felt that, in those topics where I knew nothing about, I might have been given a flaky explanation.

approximately 100% i missed only a few lectures the demonstractions and stories were well done and exceptional. Use of blackboard was good but not exceptional like the lectures, it was just like any other black board lecture

Excellent presentation style. Takes the time to make the student think and estimate answers to complex problems. Takes students questions very seriously and answers question collected (anonymously) at the end of each class and answers them during the following class

Blackboard use was great. Things were almost always clear, and if any thing wasn't clear, he'd go over it again. The best feel was the environment. I feel like the class was really exploring and felt comfortable to ask questions / be wrong. When exploring problems and different methods offered by the class, he presented them with an extreme non-bias that made them all seem possible to be right before giving his own method at the end. Best class in four years.

Exceptional Teacher, I love the way he teach! One of the best I had at MIT!

One of the best lecturers at MIT. He came well prepared to every class. His lectures fit perfectly into the class time period without rushing. The material was clear. His speaking was easy to understand and boardwriting was very legible. Never got flustered, even when many students argued with him during class. This type of participation was encouraged. He valued everyone's opinion in class. Material was well organized, and often physical experiments were brought into class to reinforce the teachings.

Teaching style was excellent, especially with the utilization of the blackboard

His presentations were always well planned and clear. I could always understand his blackboard use very easily. He had a very good balance of in class demos and thought exercises during class to keep things interesting.

very good presentation, very nice interactive style

Very interactive style of instruction. Also, fast to respond to feedback, which was solicited constantly.

Very good teacher, VERY nice, excellent examples, always listened to feedback, always encouraged feedback, told lots of stories, seriously an amazing professor overall.

Really good. Perhaps post notes before the lecture.

Great teaching style, cares deeply about students, well-prepared, one of the best instructors I've had.

One of the best instructors I have every had. Funny, well spoken, and honest. Definitely an instructor you want to have at least once while at MIT.

He has very clear presentation style and use of the blackboard. He encouraged questions and was very excited about the material. Occasionally, he went in a seemingly tangential path such that it was difficult not to zone out.

I loved how the class is so interactive.

He is very active and engaging. He can explain himself and his thought process very well, but sometimes gets moving on a problem and can leave people behind. He is more than willing to backtrack and go over steps again as long as people communicate their confusion. I don't think he needs to change a thing about his teaching style.

always made sure that people understood what he was saying, but sometimes too many people were lost to ask a question. extremely smart, and sometimes the class just had to take what he was saying as true

Slow down on some of the more difficult derivations. You have a tendency to rush through some of the harder questions. I'm able to go back and work out the skipped algebra sometimes, but this comes at some listening expense.

Liked the demos and use of blackboard was excellent. I especially liked how he gave us problems to solve and think about during lecture.

I really liked his style. I really didn't notice his presentation style or blackboard technique in general, which I think is a good thing: he just taught the material; presentation style or the like didn't get in the way. I also liked how he handed out feedback forms at the end of every class. I didn't have a comment every week, but I did sometimes, and I thought the idea was excellent.

Teaching style was great. He was very clear, encouraged questions and was a lot of fun.

Rating

Mean rating: 6.61

3 Extra questions

A goal of this subject is to promote curiosity about the world around us. Please comment on how effective the subject was in reaching that goal, and how it could be made more effective.

I wish I had more time for curiosity in general. Maybe we could as a project pick something in the world around us to estimate.

stoked my curiosity, def. look at things differently now.

I think that the subject could promote curiosity by doing "current event" -type problems so we can see what it's like to apply our problem-solving. Also, I know that most of us have background in physics and meche and that's why we got a lot of those problems, but I'd like to see that supplemented (perhaps out of class in recitation sections or supplementary problems/readings) from fields of greater variety. I enjoyed the problems that I didn't know how to solve and I wish there were more of these, though I now remember that I do have a suggestion for improvement, which is that I found Sanjoy's lectures hard to follow sometimes as they jump all over the place and most of it isn't written on the board, so when I wasn't familiar with material I had had trouble figuring out what was going on. If the chalkboard notation and/or flow/background information could be improved in clarity, that would be helpful.

As a testament to the effectiveness of this course, I find myself sometimes coming up with and trying to solve vague scientific problems in my head.

I think the subject was very effective in reaching that goal.

I used to be curious, naively curious. Now I am fearlessly curious. I feel ready to attack any problem that comes at me, and at least get a feel for why things happen. . . roughly.

I found this class very successful. It was great for conversation starters, but then when I said things in passing nobody believed me and I could not prove it as eloquently as in class so people thought I was crazy

The wide variety of topics addressed will surely stimulate all students (each one will find some aspects more appealing depending on his/her specialization and interests)

Very effective. If I didn't have to graduate, I'd take the class again.

Very good job

Sanjoy has the energy and curiousity of a Richard Feynman. It's contagious.

Maybe a little programming intensive, but still good, and got better as the class went along with the feedback forms.

It did a great job at promoting curiosity.

I already had a natural curiosity about many things in the world, but now I feel more confident in pursuing things I am curious about because now I know how to approach such questions.

There are few more important goals in tertiary education, and this class serves that purpose wonderfully.

Very effective, I try to approximate as much as I can all over the place now, especially if the word "approximate" is mentioned.

Very effective. I look forward to the book the professor plans to publish.

I love to use the estimation skills outside of class with friends who quickly give up due to a problem's difficulty. It's pretty funny to see their reactions when I get a good answer!

The subject did a very very good job of increasing that curiosity in me. I came into the class thinking that I wouldn't take much from it, but I was very wrong.

I left with the confidence that I could at least approach any problem. Continue including stories about the history behind a particular example.

Being in this class make me feel like I could solve any problem. Perhaps, more examples from past/current engineering feats would be help to enhance student curiosity.

The class was very effective in promoting curiosity. I don't really know how it could be made any more effective. The use of many different subjects throughout the term was a key component in achieving this goal however, and limiting the scope of the class to an in depth look at one subject would greatly decrease its effectiveness in promoting curiosity.

i think it would be great to have an independent project where we get to apply the new skills we learned, and present it to the class

You can see my answer below for more detail, but it definately made me more curious and ask even more questions about the way the world works.

Job well done, the grading policy also promoted curiosity.

I feel like it was reasonably effective. It probably would have been more effective if I had already known more of the course material, so that it was a small piquing of interest rather than a deluge of new stuff...

It makes me think about the world differently and has myself asking more questions about it now.

When (if ever!) would it be most useful to learn the art of approximation: high school, early undergraduate, later undergraduate, graduate school, postdoc?

Everywhere, but the earlier the better. Maybe introduce it in high school and again in later undergrad.

as young as possible, i think that it has empowered me with a mechanism to explore questions around me. this class has been one of my most valuable experiences at MIT.

I am not sure. I found it pretty useful as a later undergrad, especially because I already had some knowledge of many of the topics we covered, so I liked that it tied things together. It could be given as at the high school or early undergrad with slighting different structuring maybe? And grad school students seemed to get something out of it, too.

high school, and forever more.

Later undergraduate. Rigor is more important and should be learned first. Approximation should be used for a rough first guess, and, if rigor fails, as a fall back.

As soon as possible!

Later undergrad is probably the best time. Any time earlier it may be seen as mere problem-solving tools, instead of problem-understanding tools. Some physics knowledge is required to

know how to approximate. For foreign grads it is extremely useful, because we usually lacked that common-sense problem solving that is usually taught to US undergrads.

early undergraduate, i think this would be a great way to decide on which major you like best because it touches on everything just a little bit to help undecided freshman narrow their focus. Plus it makes MIT less intimidating when you see somebody collapse an entire semester of math into one lecture using a different thinking technique. It makes problems see more doable

The sooner the better, although when one has more a stronger physics background may better appreciate certain details that may not be obvious for an undergrad

Probably early undergraduate, but at the least later undergraduate. And if they've never learned the art, it is a must. Personally, I would have enjoyed it any time.

I think this class can be taught for Both Undergraduates and Graduates in the same class or maybe have one Introductory Level for Undergraduates and Advanced Level for Graduates

Mid Undergraduate is ideal. It is far enough along so the student won't be struggling with the math and physics, and instead can focus on the approximation techniques. Plus, at this stage, the student is more able to appreciate the need for approximation in engineering. The course should be open for graduate and post-doc students.

early undergraduate, perhaps as a required class first-term freshman year

I think as an undergraduate or graduate, you are at the point where you want to learn and can appreciate more, the techniques available. Any earlier, students may not really learn and remember or appreciate the class.

I would say that it might be best to have some in high school to help students understanding of how more complicated things work (using extreme cases in physics for example), but ALSO would be worth a second look later on when a student has more academic maturity, because approximation gives a new way of looking at things they already know.

Early undergraduate, alongside with tools of abstraction like calculus, so as to 'glue' those techniques onto reality.

Any and all times, it should be a skill taught at all ages, it is also learnable at all ages. I think it is most useful taught at the last year of high school or during college.

High school or early undergraduate. It would be a great freshman seminar.

high school would be great, before people become calculators without real thought, but some of the math concepts require higher level learning. So maybe, freshman year of college?

High school, before the strict rules of undergrad science kicks in...

A class like this would be useful as early as possible since it encourages students to jump into a problem rather than getting paralyzed by indecision. I think the class right now is focused at about an early to mid undergraduate level, and would have to be adjusted for high school, but would be useful even then. My high school experience with estimation always seemed useless, and it is helpful to present approximation as an exploratory tool.

In my opinion, the Art of Approx. is best learned later in an undergraduate education. A certain amount of rigor is necessary to develop sound mathematical reasoning and if approximations are

used too liberally in early undergraduate education, students may have to tendency to reason in ways that are simply incorrect. It is easy be courageous with approximations when you already understand the base case and know how to fix the base case when the result is in correct. Before that however, it is important to first understand the mathematical framework of base case.

I think high school would be the ideal time to learn about approximation. Before one is too laden down with detailed mathemeatical models of phenomona to really see the general ideas that connect widely ranging fields. Once one understands or is at least aware of the general ideas and models used in approximation I think they will better understand the meaning of the details that seperate one specific problem from another.

early undergrad

I think that it is in general a useful mindset to have. Almost immediately after the class I found myself "approximating" things that I would have been unconfident to do before. For example, when I went white water rafting, we were told the flow rate was $9000 ft^3/min$. Using that I approximated the speed of the water in the river and it was quite close.

Early undergraduate.

I feel like it's the sort of thing that one should be introduced to early, and learn more of as time goes on. Certainly starting in high school, if not before, would be good; though more sophisticated techniques might not be appropriate for people below the college level.

Early Undergraduate or later undergraduate, unless you have a really solid high school academic background, then in high school.

Comment on the in-class demonstrations. (How useful are they in learning the material? In creating interest in the material? How enjoyable are they?)

They were good to visualize some concepts.

very relevant to subject matter. helped me to remember concepts. really liked being involved in the experiments

The in-class demonstrations were fun and physical. I can't tell if I think there should be more or if they helped me learn at all, but they didn't hurt, and they were pretty cool. Not always that clear what the object of the demonstration was.

More! Although they're alright, they're quite obviously last minute.

In-class demonstrations reinforced what had been taught using the blackboard and were generally enjoyable.

They were very useful and interesting in their own right.

EXTREMELY useful!!! They created interest on the material, and proved things that initially seemed unbelievable.

The demonstrations were great! I felt like I could take sanjoy's word for it when he described things to us, but the demos really helped visualize everything. However, it looked like the class needed more funding with the paper cut outs and the wooden board, maybe the department can donate some money to upgrade the various apparatus :D

Interesting in-class demonstration (e.g. terminal velocity in viscous fluids, flying cones, etc.)

I liked the in-class demonstrations. It changed up the style and proved points. Very enjoyable.

Exellent Work and Demonstrations

Great demos. Often he would have us vote on our expectation of the experiment's outcome. It was good to see so much disagreement.

Very useful and it is awesome to see how things we do in theory actually work

The in-class demonstrations were really good in helping visualize and appreciate the techniques and results achieved. They kept things very interesting and everyone engaged. It was a class to look forward to attending.

very good, enjoyable, and useful

Very useful.

The demonstrations were useful and often times fascinating, we learned a lot from them, sometimes class got involved in demonstrations, that was fun too.

Definitely interested me. Sometimes hard to see in the classroom setup.

simple and useful. It's interesting to see very basic applications of complicated concepts.

They were somewhat useful. Usually if you didn't understand what was going on at the time, it made sense in retrospect.

They were very useful in giving us an experience from which to reason and to break up the pencil and paper examples.

The in-class demonstrations were awesome!

They were useful in learning the material in that they confirm (or did not confirm) some of our approximations.

demos were great, it would be nice to have many more of them

I thought that the inclass demonstrations were really amazing. In a way we could derive important and diffucult laws/formulas from extremely simple demonstrations. To me that is the epitome of genius.

They were very interesting and enjoyable.

I thought they were quite useful. Possibly some more interactive ones would be nice.

The demonstrations helped me remember concepts and they definitely were interesting. I'd like to see more of those.

What additional topics would you like the subject to cover?

More examples. . . although they might be hard to squeeze in.

would be cool to do a mini project during the term where given an open research problem that challenges students to come up with their own hypothesis and interrogate it through an approx.

How to find information you don't know anything about: for most of the problems, Sanjoy gave us the variables/info we needed to know to solve it (he often asked us, too, but a lot of us already

had background), and I'd like to know how to approach a problem if you aren't sure how to attack it. Like, resources/methods of organizing material, etc. Maybe a mention in the book of a single lecture; I am not sure.

More EE/CS examples.

A little more biology would have been nice. Maybe because I know nothing about it, and still fear it a little bit :-)

The assortment was good enough. Maybe more material science examples and less programing

I liked the current covered subjects.

Optics, Radiation, Dynamics.

a better cover on the ability to actually estimate lengths and and other things.

More design engineering examples would be great.

More applications to chemistry would have been interesting.

more on economics,

Being a mechanical engineer, I liked the topics that were covered. I think with that the energy approximations were particularly useful (i.e fuel efficiency of jet vs. car, gas consumption of US, etc). With energy being a more importannt issue, I think that its good if people become comfortable with approximating with energy units, formulas, and considerations.

I thought that the topics covered were tremendously helpful. Most of them were new to me (at least their applications) so I can't think of any new topics at the moment.

Biomedical Engineering examples.