Students were instructed: Please take one minute to write down any feedback about my lectures in this course: what is working, what is not working. In particular, I should like feedback about the one minute discussions.

183 responses. Some comments summarised in tables below. My responses indented, or in italics when in text. There will be further responses in class. Thanks to all students for your help.

<table>
<thead>
<tr>
<th>Speed</th>
<th>too fast</th>
<th>just right</th>
<th>too slow</th>
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<tbody>
<tr>
<td></td>
<td>30</td>
<td>12</td>
<td>0</td>
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"often lost, explanations too complicated, speak too fast"... "teaching is quick however by checking the notes and reading the textbook it is possible to keep up. However I guess this is what you get with the transition from school to university, and in time we'll get used to it"... "could be slower and I would absorb more"... "Not bad. You make it interesting. Go a bit fast in places"... "going at a decent pace, just takes time to adjust to."... "excellent but went too fast in the beginning"... "some explanations are difficult to understand, especially with the complex ideas; the pace is quite fast"... "a bit fast, but that's uni!! I'll be used to it"... "Good speed in explaining aspects of physics"... "was going very fast at the beginning, but is starting to make sense now"... "95% good pace, 5% too slow or too fast"... "sometimes too fast, mainly ok"... "sometimes goes very quickly—steps skipped and this causes confusion"... "sometimes explaining goes too fast"... "too fast and difficult because my English is not very good"... "I enjoyed physics at HS but I find you go really quick. I don't pick stuff up quickly enough"... "fast and sometimes difficult to follow"... "hard to go through so many things in a lecture. Maybe because I just started uni, I'll get used to it"... "more time needed for harder concepts"... "concepts not as clear as they could be, possibly due to the speed"... "course is very jumpy, changing from one topic to another too quickly and too regularly, hard to understand what's going on"... "With my level of physics and the speed with which you are taking these lectures, I am getting a lot out.... really interesting"... "trouble keeping up; didn't do physics in HS"... "teaching very interesting but having trouble to keep up and understanding everything"... "in week one, I was finding it a little difficult to keep up although since purchasing the text, my comprehension has improved tremendously (but then again, I wont know for sure until I attempt the practice exam)"

I shall try to slow down, but don't have a lot of room. I deliberately went a bit fast in the first week to shock you from HS pace into Uni pace. (Also, certain other schools didn't have tuts or labs in week 1, so you had more time for physics. Yay!) It will go a little slower now, but not much.

This is a common response in students starting university: it does go much faster than HS, and you'll have to adapt your learning technique. I don't want to seem harsh but, out of a class this size, if I had fewer complaints than this, I would probably guess I was going too slowly. So I'm sorry but, with all the constraints, there's really not much I can do about this. However, there are things you can do. (i) Read a chapter ahead in your text book—you'll be surprised how much this helps: see the last student comment above. (ii) If you're having trouble keeping up, you don't need to follow simple mechanical operations, such as solving simultaneous equations, in the lecture—you can look at that in detail later in the downloaded notes. Instead, concentrate on listening to the explanation and the description of the development or problem solving strategy that I give orally.

**Assumed knowledge**

"(did HS physics, no maths).finding it hard to keep up with"... "too much expected, some of us know, some don't"

We pretend that you have no knowledge of physics, but it would be difficult to keep up with the pace if that were true. On the other hand, we assume that you can differentiate, integrate, substitute and solve simultaneous equations. If you are uncomfortable with these techniques, then I'm afraid that you'll have to do some serious revision. NSW has a quite good HS maths syllabus.

<table>
<thead>
<tr>
<th>Maths</th>
<th>too fast</th>
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<tbody>
<tr>
<td></td>
<td>14</td>
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"High school physics did not involve 'detailed' maths, therefore difficult to translate (from HS to uni)."... "I get lost because my maths is rusty :)"... "more explanations needed for equations and maths"
The notes are only notes. They are not a substitute for a text book. I don't write long, careful explanations in them. Prof Hecht does, and that's why his book is so fat. My notes are a skeleton of the development, often using contractions and symbols rather than words. But the text book has much more complete explanations.

What are the notes for? If I were in your position, I should download them before the class, and bring them to the lecture. Note the blank space on the RHS. That is for you to write further comments in lectures (if you need more room, print them single sided and there's more room on the back). But the main thing you should do in class is to listen and to watch (and then talk in the minute discussions). Where necessary, ask questions.

Web site very helpful useful

"amazing web resources, thank you!"...

one minute discussions good/ very useful okay not useful not clear

"promote thought rather than blind copying down"... "(not useful because) neighbours agree with me and don't require convincing"... "getting us involved and thinking"... "good idea because they encourage us to
develop our own understanding"... "makes us do some thinking for ourselves, and therefore make clear
the extent to which we understand the topic"... "forces us to try and understand it better ourselves in order
to adequately convince someone else"... "they are what we (the students) make of them but the insightful
answers from clever students are beneficial. Gets us thinking"... "mainly let yourself think to see if you
understand the concept"... "stopping to get us to discuss things is good although I'm often confused (in
a kind of good way, because I don't think that I understand it when I actually don't)"... "gets me thinking,
alert, engaged"... "a positive because (they) facilitate involvement"... "makes people think and consider
problems leading to better understanding"... "aren't useful if people beside don't like talking"... "sometimes not useful, however they can still be good"... "helpful and not as 'scary' as talking or
explaining yourself ... in front of an audience"... "helpful only when we have a general idea...hint would help"... "useful way to share ideas and communicate with new people"... "really good and you get to meet
new people"... "I enjoy how you let us try to figure out the problems ourselves as a group before you tell
us the answer"... "pointless: we don't have an idea and we just use time to chat"... "works if you're sitting
next to right person. Gives us time to get our head around things before you bombard us with the
answer"... "many students need to be motivated to interact with you and other students so they could get
more out of lectures"... "my brain is not in thinking mode yet but asking me questions is a very good way
to fix that"... "great opportunity to grasp some rather complicated concepts and also great for making new
friends"... 

I'm glad that these seem to be working. Suggestions to improve them are welcome. BTW, I think
that the social aspect is important—students often find uni impersonal, and it's good to meet people.
However, once you have introduced yourself, you should talk physics for the minute. Leave the
further socialising until you get up to leave the lecture!

demos very useful, good etc need more
64
4 
"help us see it"... "keep concentration" ..."brightens up the whole lecture"... "much better than long and
boring equations"... "good for learning"... "allow a basic understanding of what you are talking about"... 
"examples with real numbers also be helpful"... "keeps me alert"... "increases interest by learning through
real life"... "interesting, and help us to remember the theory part of the subject"... "good and relevant use
of props acts to grab attention back"... "make it easier to understand than mathematical proof"... 
"experiments in class show great insight into some very obscure problems"... 

This response is gratifying but not surprising. Physics is an experimental science and it's the best
way to teach it. I shall pass on your response to the staff who make and prepare the gear.

worked examples very useful need too
5
8
3 
"some examples are hard to understand at first as all the working is shown straight away"... "Initially, I
did not like the incidental learning through examples, since I didn't feel I was 'learning' anything, rather
just being told interesting problems. I would like the class to go through "theory", "explanations",
"understanding of concepts", before examples."... "need to be better explained"... "Personally, I find it
easier to think firstly without using mathematics and then to use mathematics to prove my hypothesis"... 
"sometimes you go through examples too quickly"... "should be more thoroughly expressed and
worked"... "examples with real numbers would also be helpful"... "you are just ... answering physics
questions. I have not seen any 'lectures'—just answered problems and solutions. It feels like a tutorial
class"... "lots of examples, theory side isn't explained sufficiently"... "more examples would help us
understand deeply"... "working of problems often appears illogical or disjointed. Perhaps spend more time
or make sure they are on line so we can look at them after class" they are on line "useful to have a few
problems, but there's no theory! I need theory to understand problems"... 

I am experimenting with different approaches in this course: sometimes posing the problem before
developing the ideas needed to solve it (some people react better to that way) and sometimes doing
the theory first. I'll look forward to your further feedback. I shall try to be slower and clearer in
explaining the tactics and principles needed to solve problems (see also the introductory part of the
tutorial problem booklet, and the introductory chapter in Hecht). See the remarks about speed above:
the slides are in the on-line notes, and you can go through the mathematics and the calculation at the
speed you like. The first 4 lectures were mainly just revising mathematical techniques, we didn't start physics until lecture 5. Plenty of theory to come. I don't think there will be room for a higher proportion of worked examples, because of time constraints.

<table>
<thead>
<tr>
<th>explanations</th>
<th>very good</th>
<th>pretty good</th>
<th>more explanation of new concepts</th>
<th>too complicated</th>
<th>not clear</th>
<th>too fast</th>
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<tr>
<td></td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>5</td>
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and lectures

Thanks for the positive responses. Thanks too for the criticisms:

"Your lectures are great, everything's working"... "the interactive way of teaching and demonstrations are really good"... "Very exuberant and fun style makes lectures interesting"... "Your enthusiasm is good"... "you jump a little, expecting this to be presumed knowledge"... "funny, interesting, however sometimes boring"... "Please explain the formulas you use before doing examples and please explain the symbols and subscripts more clearly"... "More deviation from syllabus would make lectures more interesting" but would annoy some students "goes off topic too often"... "I like your approach and explanation, especially the experiments you bring in. It beats hand-writing exercise"... "really great"... "everything is good. It's fun, keeps you awake"... "great! good interaction (jokes, getting people to come up and be the sun) asking people questions. Good examples."... "use of projectors enjoyable"... "2 thumbs up"... "possibly more in-depth exploration of theory"... "good implementation of discussion. Good combination of prac and theory"... "Don't understand everything straight away, but it becomes clear throughout the lecture"... "Very nice"... "interesting and clearly explained"... "Lectures are engaging and I maintain my focus (don't fall asleep!) Good work!"... "Your active character keeps me well entertained and informed"... "Your enthusiasm keeps me awake"... "Great teaching because you're enthusiastic"... "Better than high school. Some parts (eg circular motion) were a bit hard to understand... Doesn't bore me to sleep so it's a class I don't skip :)"... "10/10"... "This is the only class that I am able to stay awake in literally"... "great that explanations are illustrated and demonstrated, makes physics more realistic an therefore interesting"... "deeper and maybe simpler explanations could be helpful"... "anecdotes excellent"... "I normally get confused in your lecture half way"... "Your teaching is good to understand, not just book-followed, but involves body language & plenty experiments"... "I am content to this point"... "sometimes your explaining is not 100% clear"... ask when that happens "This is the ideal lecture. only lecture I look forward to and never fall asleep in"... "you seem to really enjoy physics and how you get excited describing principles encourages me to learn and also get excited (almost)"... "need more explanation at simpler level"... "more time on elementary fundamental concepts"... "explaining things in multiple methods is good"... "method of teaching, working, practical examples and discussions are a really good combo. I'm finding the lectures enjoyable and a lot easier to understand the work with the different approaches"... "you can explain everything really clear. And you are funny"... "too fast and explanation is not really clear (just thoroughly) and some people don't really understand the physical explanation behind a question"... stop me when that happens "love the energy you put in"... "you certainly make everything very interesting (and relevant, which was a problem with HS physics) but sometimes the equations/explanations fly past too fast for me. This is probably what tutorials are meant for though"... "informative, good learning environment"... "course is very jumpy, changing from one topic to another too quickly and also too regularly, hard to understand what's going on"... "challenging, however the way it is taught makes it interesting and amusing"... "very happy... hope my future lecturers will be as good"... "I love the practical aspect... but don't know what to expect in exams."... "just fine"... "maintains attention of students"... "engaging approach to teaching"I like your energetic examples eg jumping on the table"... "Interesting, favourite class"... "Never feel sleepy in your lecture, well done"

Lecture planning

"A quick revision of the previous lecture at the start of each lecture would help us"... "Should have an outline: what will be told today"... "Organised"... "good and carefully planned lectures"

It would be nice to do more overview and summing up, but time is short, and most of the suggestions were to have more explanations, more problems etc. How about this: why don't you revise the preceding lecture at home or in the bus on the way to uni? Don't just use the notes, use the text as well."
Lecturing techniques
"Don't write on blackboard, use OHP. Or write bigger"... "I can actually read what's on the board, unlike most other lectures"... "sometimes hard to read"... I did experiment reading myself from the back row before deciding on font sizes. Maybe you could try sitting closer. "you take too much ... from people talking and walking in late and disturbing others"... "allow too much talking in class"... To me, the class seems very quiet after the first five minutes. Perhaps we can train the lecturers in the preceding classes to finish on time, or else get skateboards for coming down Mussolini Way from the Matthews building... "Try to check if everyone has understood what you have explained"... I shall, but please feel free to call out if I don't notice your puzzled face. "tell us when stuff is not in the notes"... nearly everything is. Why not bring the notes along to the lecture? "say this the equation that governs this law, you need to know it"... My code: red lines mean essential to know & remember; blue is out of syllabus but interesting, no colour is intermediate importance. "good use of OHP. Please ensure people have time to copy work"... almost everything is in download notes, but shout if you miss something "It would be easier to understand if say, some were worked on the blackboard/overhead, written on the fly"... "I find lectures clearer when lecturers write on OHP as they go,...you get an insight into thought processes" You might not find my handwriting quite as clear. But seriously, I do know what you mean and have thought about it and on balance decided to go this way, largely because students I have surveyed prefer it. I do try to explain the thought processes, and feel free to let me know if I don't make them clear.

Relation to syllabus and text  "suggest recommended reading and exercises"... "maybe tell us next lesson's topic so we can read up on it before the lesson? Or is that the idea behind the puzzles"... "write up the reference material such as what chapters to read"... "Tell us what chapter we're up to"... "Perhaps I have haven't understood something here, so you may need to explain it to me. The syllabus has the chapter and section numbers from Hecht (and you could easily find the equivalents in another text). I cover the topics in an order very close to that on the syllabus, so it's easy to know what to read in advance or after a lecture. The main exercises I recommend are those on the tutorial sheets. However, the problems at the back of the relevant chapter of Hecht or any other text are fine. At the start of each section (sometimes one lecture, sometimes more) I give an outline of topics.

Interaction with students
"interactivity with students good"... "Your animation and involvement of students keeps everyone interested, and therefore learning"... "Maybe you shouldn't worry so much about classes. Kinda insecure"... "Very personal with students, which is good"... you involve the students"... "engages the students"... "most interesting and arresting"... "The enthusiasm of teaching helps points being understood as you don't fall half asleep during the lecture"... "makes learning interesting"... "keeps everyone focussed"

Humour  good, entertaining, maintains interest etc
9
Voice  loud enough loud enough but can do with a \mu\text{phone} use mic
2 1 6

In a class of 450, this response suggests that I don't need to use a mic. I'm happy about this, because with my lecturing style I run the risk of strangulation when using a mic! Also, when lecturers use a mic, classes are often much louder. If you are having trouble hearing, try to come earlier and sit near the front, where the students are quieter.

Puzzles  good need more
4 1
"Brain teasers spark interest in young and curious minds"... "focussed towards higher thought ('why'?s), keep things interesting"... "Puzzles really good"... "would like more puzzling questions or interesting stuff which haven't been answered"... "So far the work has not been challenging—but the questioning of what we have always taken for granted helps to understand why"... "you may leave a harder puzzle after each lecture"... "a little difficult for those of us who have not had much exposure to physics, especially theoretical questions"... "some of the theories are too abstract, or maybe I am not good in maths or not smart enough"... "hypothetical problems (give me) great difficulties"... "thought provoking"... "a lot of good, thoughtful questions"... "big jump from HSC physics, conceptually"... " 
Some of these go beyond well the syllabus, so don't be worried if they seem difficult. Remember that I am trying to benefit not just the average students, but also the students at both ends of the distribution. BTW, where does that water container end up?

**Relation to tutorials**
"Tutorials are not good to go into depth on discussion you are raising"... "Some connection between tutorials and lectures could be helpful. ie if you spent a few min working out a difficult tut problem that tutors may not have given a convincing answer for"... "Too much theory, not enough calculations/examples, not related to tutorial questions, not learning much from lectures, good acting and demonstrations"... "The tutorials strangely are ahead of lectures!"... "Lectures are good but work doesn't relate to tutorials. Tutorial sessions aren't good"... "understand tuts, don't necessarily understand lectures"... "Relationship between lecture content and tutorial problems is occasionally tenuous"... "more examples...taken from the harder tutorial questions"... "would be nice to get solutions"... "I have trouble connecting lectures and tutorial probs"... "Don't see how lectures and tutorial exercises relate"... "no clear relation... established"... "doesn't cover material in my tutorials or I am missing the background required"... "Can you give us answers to tutorial exercises? I queue in classes to ask one question"... "Although it is beyond your control, I belive that the tutorial classes are too large"

At first I thought that this was a real worry. However, I realise that in week 2 some of you had only had one tutorial, when you discussed tutorial sheet zero (week 1). Because you were to prepare this for the first tutorial, after zero lectures, this sheet is just to revise high school material. So, for this one problem sheet, you're right, it has no relation to the lectures. For tut sheet 1 (tut class in week 2), however, I hope that you found that the first week's lectures were a good preparation. If not, please advise.

The examples I do in lectures are intended to show the same skills that you will use in the tutorial problems. However, I shall try to do no problem in lectures that is very similar to a tutorial problem. Sketches of the tut solutions are on the web.

**Notation**
Mine is too different from HS (12 people said this).

The reasons why I write e.g.

\[ y = y_0 + v_{y0}t + \frac{1}{2} a_y t^2 \quad \text{rather than} \quad s = ut + \frac{1}{2} at^2 \]

are these: (i) we often look at motion in more than one dimension, and so need to specify displacements in x, y and z directions (ii) we often consider the motion of more than one object, so we cannot always choose coordinates in which \( y_0 = 0 \). My notation is very similar (if not identical) to that of Hecht.

Too much shorthand.
My lecture slides and notes are deliberately short and in note form. If you want a long form, read the text.

**Specifics**
"When teaching about \( \mathbf{i}, \mathbf{j}, \mathbf{k} \) vectors, I didn't understand exactly what you were trying to tell us—it wasn't clear what we were supposed to learn from your examples. However clarity in general is good, class is interesting." 
"(the notes) were good until page 8 on components and unit vectors which did not explain the diagrams. What were we supposed to be looking for?"... *These were just a tool that we needed for vector addition. I'll show you much more about them when we meet the scalar and vector products*

"Explain symbols, subscripts more (several respondents)" I'll try to do better, I have updated first set of notes to include more of these. Also listen, as I usually say more than what is in the notes.

Uni physics requires a lot of maths, not theory? A fair amount of both

What is the difference between a law and a definition? A definition is something decided by humans. We decide to call the time rate of change of velocity the acceleration. A law of physics, such as \( F = ma \), is something that is experimentally testable and falsifiable, which has been extensively tested experimentally but which has not yet been falsified.

What is difference between inertial mass \( m_i \) and gravitational mass \( m_g \)?

\[ m_i = F_{\text{applied}} / a \quad m_g = \text{Weight} / g \]
"Talk more about the history" I shall mention it in passing but sorry, this course is physics, not history or the HSC subject. The history is interesting and sometimes fun, but it is also almost completely irrelevant. If X had not discovered/postulated Y in year Z, someone else would have later (although in the single case of general relativity I have heard the contrary position argued.)

How much to know
"Are the notes enough for the exam?" "Is this all we have to know to sit for the exam?" This? My notes alone are not enough. "I don't know whether what you're teaching us is enough, or whether we have to learn things in detail at home." That's hard to answer. You'll certainly need to do some homework, typically a few hours a week for this subject. The tut questions are a good guide. If you can do all or nearly all of these without help, then you have learned enough to get a good pass. "Other than the text book, what other information do we have to know?" If you know all of Hecht, you'll be safe!

Miscellany.
"lecture theatre too big"... "other examples good"... ? "Emphasis on interpreting questions into graphical nature then understanding it?" I don't know what you mean. Personally I find that graphs and diagrams help me understand. "It would be good to know more of the syllabus/outcomes of this course" The syllabus is on the web. Sorry about the outcomes: they will be there shortly. "you run funny"... "Lecturer is ----"... "Joe is cool"... "you're a funny bastard"... "good dancing"... "love your shoes". Don't worry, I can handle a bit of sarcasm.

Thanks everyone. I'll explain in class how I'll try to deal with some of these issues as the course progresses.