Flipping the Classroom
How to start small

Ralf Becker

ralf.becker@manchester.ac.uk

Lectures are over-rated!
and
under-utilised!

This is my thesis.

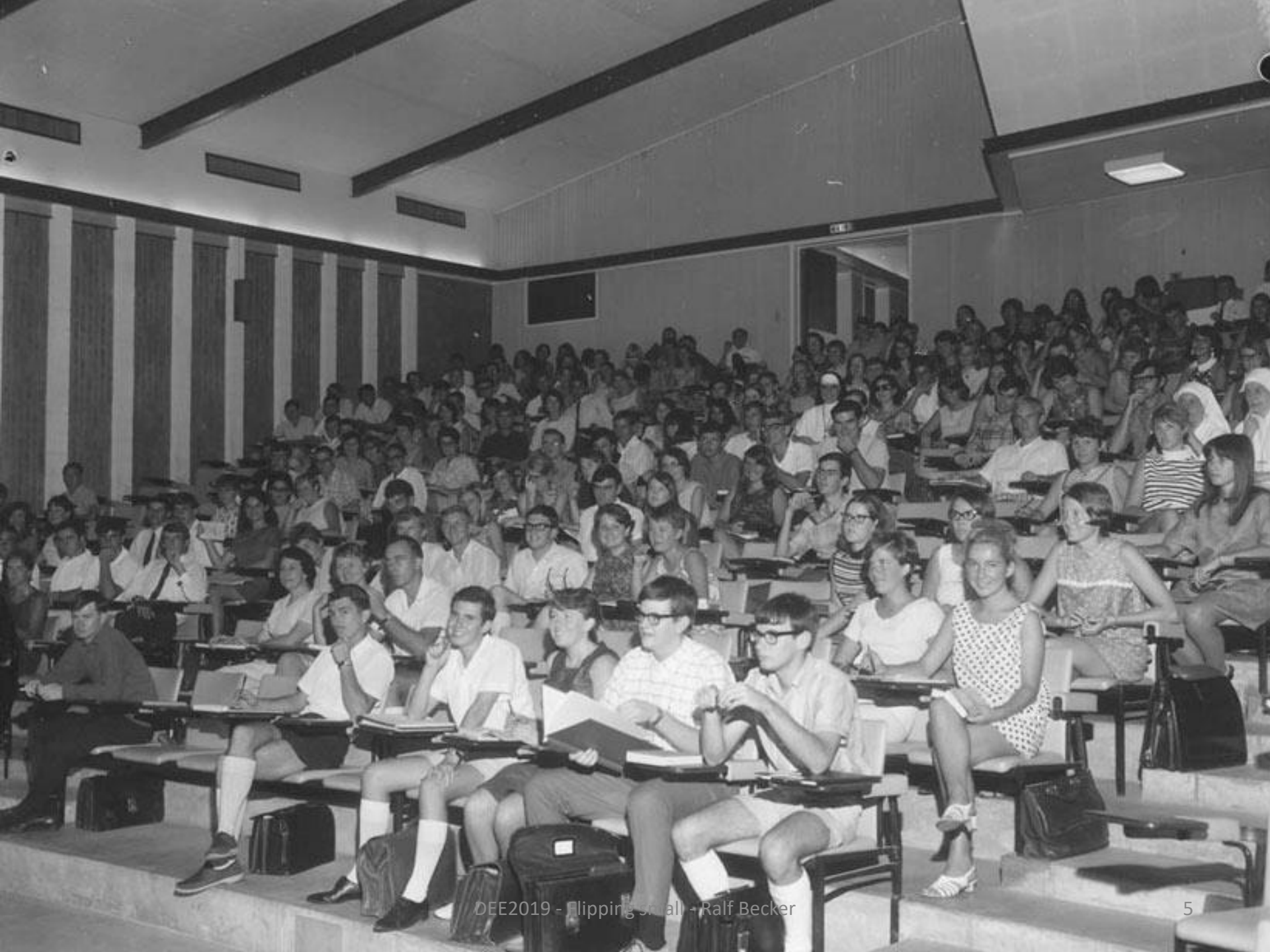
What do we want to achieve with a course unit?

- Facilitate student's (independent) learning
- Memorise information
- Extract principles and underlying meaning
- Integrate new with previously acquired knowledge
- Enable students to apply their knowledge in a new context

Source: University of Manchester, Manual of Academic Procedures

What tools do we have?

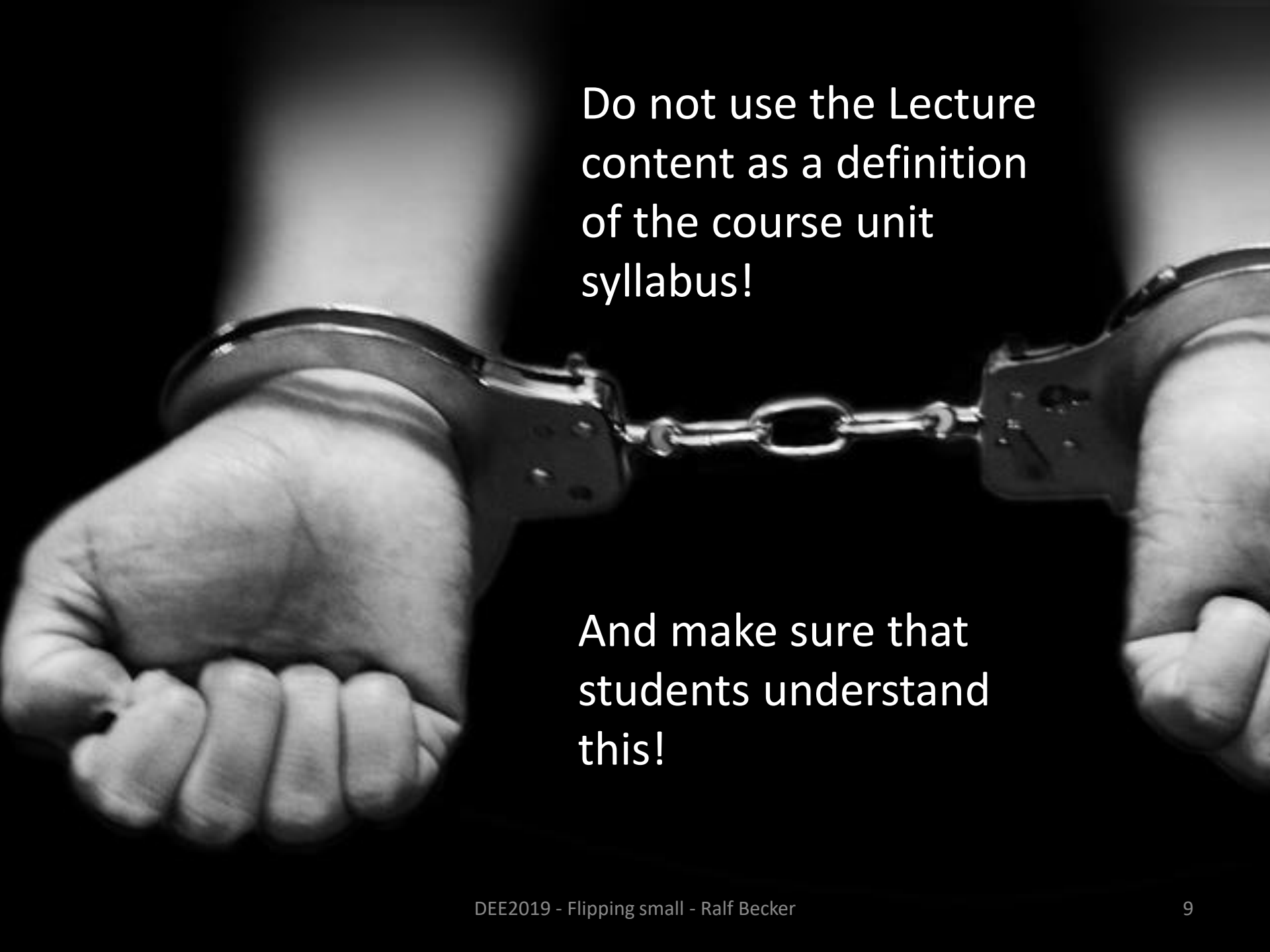
- Lectures
- Tutorials/Seminars
- Reading
- Coursework/Groupwork
- Online quizzes
- Podcasts
- Online Clips
- Peer Assisted Study Schemes




ULB
G11

What does typically happen in a lecture?

- Main vehicle to convey material
- Mostly done by the lecturer presenting
- Extra reading and tutorials to supplement that material
- Coursework to deepen knowledge (often on a particular aspect of the material)


Do not use the Lecture content as a definition of the course unit syllabus!
And make sure that students understand this!

Understanding of Learning

- (Deep) knowledge is constructed not passed on
- Students aim to integrate new material with existing knowledge and real life experiences
- May have to overcome existing mental models which is likely to require:
  - some element of active learning
  - student's motivation to learn

The aim:

Engage more students into this type of learning

Lit: good summary by Steve Draper (Glasgow)

Active Learning

Students actively engage with material / challenge their preconceived understanding

- Motivated students will typically do this by fully engaging with extra reading/tutorial questions/coursework and reading beyond the expected
- Can happen in different settings (but typically doesn't happen in a traditional lecture)
- Why not?

Aim: By moving elements of active learning into the classroom we can perhaps engage more students into activities that facilitate deep learning

Lit: Meta analysis of active learning in STEM, Freeman et al., PNAS, 2014

Challenges

- How can we create space in the lecture?
- What should we do in the lecture?

Think about the entire learning process not only the lecture!

- What is best achieved by lectures?
- What best by other tools?

Restrictions:

- School guidelines on how many lectures and tutorials you should put up
- Convention/Student expectation and work pattern
- Your workload


Your role in influencing
Student
behaviour and motivation

The Learning Week

The Lecture

Practical Tip – Make your VLE do the work

"Outsource" part of the (**examinable!!!!**) material away from lectures (either **before** or **after**)

- personally often to online clips, but could be reading or podcasts or other delivery means as well
- Very introductory exposition
- Long and tedious (but important) arguments
- Proofs

This gives **more time in lectures for**:

- More complex/subtle material
- Extended Examples
- Discussion
- Staff/Student and Student/Student interaction (e.g. quizzes, small practice questions)

Some practical hints
Discussion Board

A well-run discussion board can help with student engagement

- Requires seeding with information at the beginning
- Expectation that students show effort

- Encourage other students to answer/comment
- allow anonymous posts

We started using Piazza.com

-> Keeps your email inbox clear

Some practical hints for lectures

Assumption: You have created time in the lecture. Students know that non-lecture material is examinable!

Aim: To increase student engagement in lectures

This has been tried on classes with up to 600 students

Discuss with neighbour/answer Q

- Could be to test
  - Understanding of pre-lecture work
  - Apply pre-lecture work
  - Just to warm students up and get them talking
  - Let them think about a problem that is central to the rest of the session
- Use technology (Mentimeter, polleverywhere, piazza)
- Consider using peer instruction element.
  As per Eric Mazur
  (google: Eric Mazur and peer instruction)

Let students work on examples

- Especially useful for units which have quantitative/analytical content
- Do this right after teaching a new concept
  1. Teach concept
  2. Give worked example
  3. Let students solve an example

Example 1

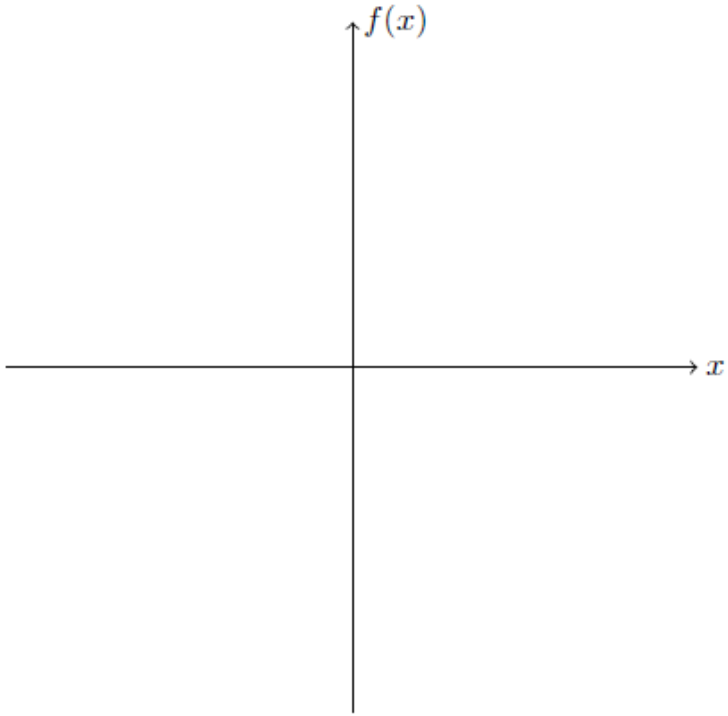
Find stationary points and determine whether they are minima or maxima?

$f(x) = x^3 - 3x$

$f'(x) =$

$f'(x) = 0$ if:

$f''(x) =$



Let students work on examples

Instruct students to work with neighbour

While they work …

- Walk around
- Look over the students' shoulder
- If you see a student not working ask where they are stuck
- If you have a very large class consider using TAs in lecture

It is not important to see all students

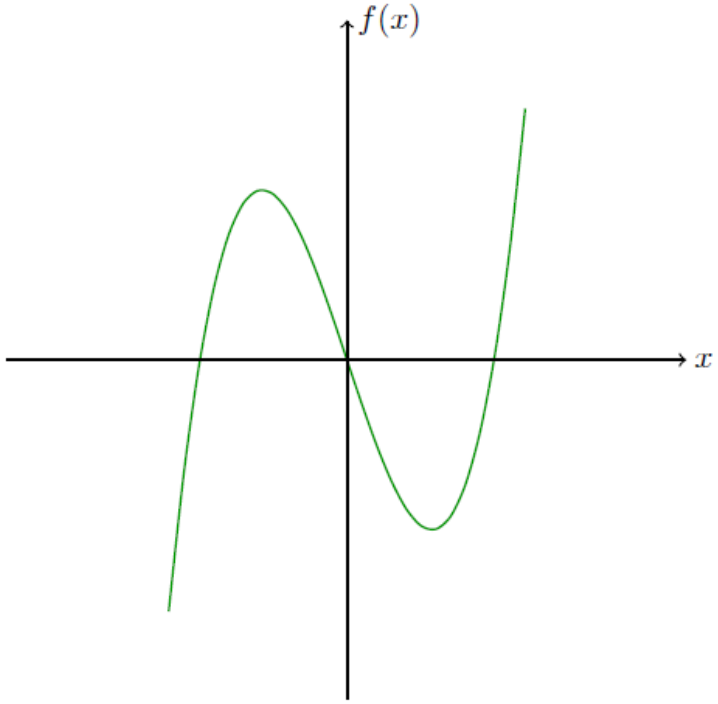
Example 1

Find stationary points and determine whether they are minima or maxima?

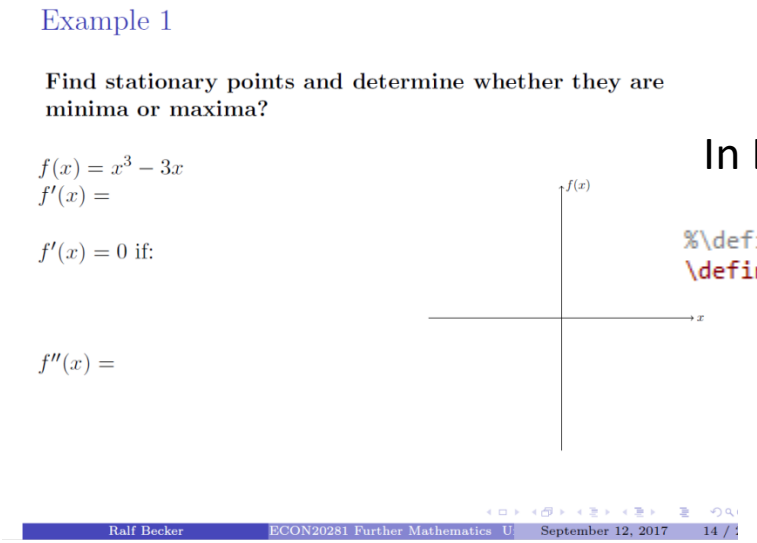
$f(x) = x^3 - 3x$
$f'(x) = 3x^2 - 3 = 3(x^2 - 1)$

$f'(x) = 0$ if: $\iff x^2 = 1 \Rightarrow x = 1$ or -1
These are stationary points.

$f''(x) = 6x$, $f''(1) = 6 > 0 : x = 1$ is a local minimum.
$f''(-1) = -6 < 0 : x = -1$ is a local maximum.
Clearly these are local optima?



Lecture Notes productivity tip



YouTube

https://youtu.be/v5ZAGvXFxV8

In Latex:

```
%\definecolor{student}{rgb}{255, 255, 255}  % white - use for student version
\definecolor{student}{rgb}{0,0.6,0}  % green - use for full version

$f(x)=x^3-3x$\\

$f'(x)=$ {\color{student} $3x^2$  $-3$  $=3(x^2-1)$}\\
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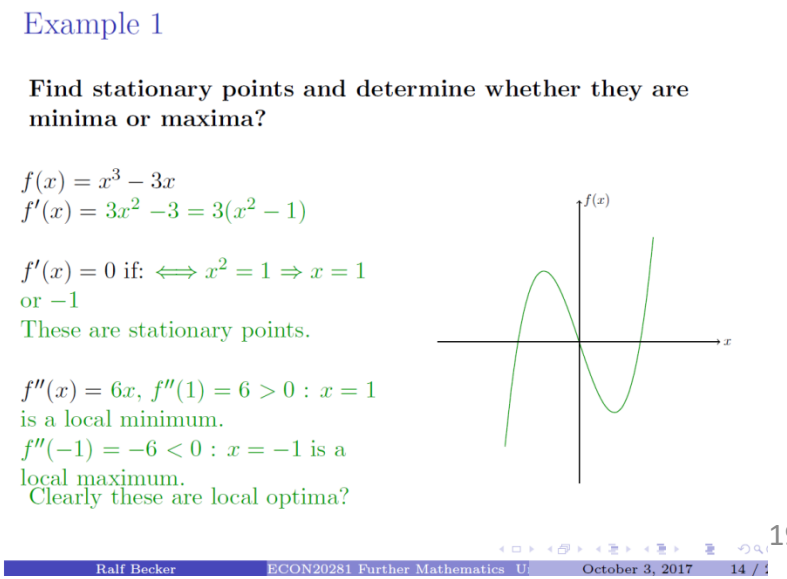

In PowerPoint:

Ensure that students take notes

- Print the incomplete slides and use the visualiser/doc camera
- Ensure that students take notes (if not why?)
  - Underline/circle/highlight
  - Leave deliberate gaps
  - Produce graphs on the paper
  - Tell them: “I see only a few of you think that this is important enough to note down.”
- Do use lectures to tell students how you expect them to study.

Summary thoughts

- Be incentive compatible
  If you asked students to read stuff between lectures … don't cover the material again in the lecture
- Tell students why you do things that may be unpopular (like not giving solutions)

Do things in lectures that is not delivered in any other way (textbook, videos)

- What is **your comparative advantage**?
- What is it **you enjoy**?
- Think more about student's learning
- Don't allow students to be passive (all the time)
- Be a coach!

Gradual changes

- Think what is working well
- No need to change everything at once
- Start with the topic which you are most unhappy with / you think that you could “add so much more”