University of Glasgow

ASTRONOMY & PHYSICS EDUCATION

Teaching & Learning in the School of Physics & Astronomy

Dr Peter H. Sneddon

Peter.Sneddon@glasgow.ac.uk

University of Glasgow

ASTRONOMY & PHYSICS EDUCATION

PART 3: GUIDANCE FOR DELIVERING LECTURES – Part 2

University of Glasgow

Content

ASTRONOMY & PHYSICS EDUCATION

- PART 2 – GUIDANCE FOR DELIVERING LECTURES
  - 2(i) – Guidance and Advice
    - the principles which underline the University's approach to teaching and learning
  - 2(ii) – Some policies you should be aware of
    - Lecture recording policy
    - Digital accessibility policy
    - Accessible and inclusive learning policy
  - 2(iii) – ADD: Academic & Digital Development Team
    - What help can the University's professional trainers offer you?
  - 2(iv) – Yes … but what should I actually do?!
    - Practical tips for your lectures

University of Glasgow

ASTRONOMY & PHYSICS EDUCATION

REMEMBER ...

The

CLASS AND LAB HEADS

are the

MOST IMPORTANT PEOPLE

for you to contact with

ANY QUESTIONS

you have about your course/allocations!

University of Glasgow

ASTRONOMY & PHYSICS EDUCATION

PART 2(iv): Yes … but what should I actually *do?!*

Practical tips for your lectures

University of Glasgow

ASTRONOMY & PHYSICS EDUCATION

LECTURES

Length of a lecture

- Lectures can be scheduled anytime between 0900 and 1800, Monday to Friday, through both Semesters.

- **The official lecture "hour" runs for 50 minutes from xx05 to xx55.**
  - MUST NOT exceed this 50 minute period.

Typical class admin structure

- Level 1 and 2:
  - Each class has a Class Head (aka Class Co-Ordinator) and Deputy
  - Each class has a Lab Head and Deputy
  - A lab technician
  - Support from the P&A Teaching Support Team

- Level 3, 4 and 5:
  - Physics – Class Head and Deputy for Physics 3.
  - Physics – Class Head and Deputy for Physics 4/5.
  - Astronomy – Class Head and Deputy for Astronomy 3/4/5
  - Each have their own lab technician
  - Support from the P&A Teaching Support Team

University of Glasgow

Typical class admin structure

ASTRONOMY & PHYSICS EDUCATION

The

CLASS AND LAB HEADS

are the

MOST IMPORTANT PEOPLE

for you to contact with

ANY QUESTIONS

you have about your course/allocations!

Length of a lecture course

- A1/P1/A2/P2 – usually 8 or 9 lectures, usually concentrated into half semester (1 or 2 lectures a week)
  - Double teaching in Physics 1
- P3/4/5 – usually 18 lectures, running throughout S1 or S2, twice a week
- A3/4/5 – usually 27 lectures, run either in S1 or S2, or across both

Content of a lecture course

- Content is **pre-determined** – you should **not** make major changes to what you plan to teach without first speaking to your Class Head.
- Each course has a Course Guide containing the Intended Learning Outcomes for the course.
- You will normally inherit a course and materials from a colleague
- HOW you deliver your lecture course is up to you, though there are some basics you are expected to provide – we'll come back to this.

Lecture venue facilities

- P&A lecture venues are assigned centrally – you can end up teaching ANYWHERE on campus.
- All lecture theatres contain (usually) a functioning desktop computer attached to one or two overhead projectors. Rooms also (usually) have writing surfaces of some form, and a visualiser.
- There are also facilities to connect your own laptop if you prefer.
- You can get an idea of what your lecture venue will look like, and check the facilities in any centrally controlled room, at https://www.gla.ac.uk/myglasgow/estates/timetabling/roomphotos/
- You can find your way around campus at https://www.gla.ac.uk/explore/maps/

How should I deliver my lectures?

- The School does **not** insist on any one particular teaching delivery method for lectures
  - We want to make sure that you are free to deliver your material in the way that suits you best.
  - We also believe it is important that students learn to learn from a range of teaching methods.
- PART 2 will look at some examples of approaches you can take.
- However … there is a basic minimum provision level that is required.

University of Glasgow

Things to try

ASTRONOMY & PHYSICS EDUCATION

- Remember to introduce yourself!
- In your first lecture clearly explain HOW you will be delivering your course.
- Will you be expecting the class to do pre-reading?
- Will there be recordings? Where will then be found? When will they be available?
- Will there be notes? Should students have them to hand in the lecture?
- How can they contact you with questions?

University of Glasgow

Things to try

ASTRONOMY & PHYSICS EDUCATION

- In later lectures, start with a recap of previous lecture – “Can anyone tell me what we did last time?”
- Each time you begin, introduce the topic for that day’s session
- If you are using pre-recorded videos, try to keep them to below 10 minutes in length.
- Depending on the length of the session, consider “coffee breaks”. In a 50 minute lecture, probably not necessary, but if the session exceeds ~1 hour, give everyone (including yourself) a chance to stretch their legs.

University of Glasgow

Things to try

ASTRONOMY & PHYSICS EDUCATION

My notes

Physics 1 – OWL2 – Dr P. H. Sneddon

EXAMPLE (15.7 from Y&F 13th Edition)

Transverse waves on a string have a wave speed of 8.00 ms^{-1}, amplitude 0.0700 m and wavelength 0.320 m. The waves travel in the $-x$-direction, and at $t = 0$ the $x = 0$ end of the string has its maximum upward displacement.

(a) Find the frequency, period, and wave number of these waves.
(b) Write a wave function describing the wave.
(c) Find the transverse displacement of a particle at $x = 0.360\ m$ at time $t = 0.150\ s$.
(d) How much time must elapse from the instant in part (c) until the particle at $x = 0.360\ m$ next has maximum upward displacement?

SOLUTION:

(a)

$$v = f\lambda \Rightarrow f = \frac{v}{\lambda} = \frac{8.00}{0.320}\frac{\text{ms}^1}{\text{m}} = \frac{8}{32\times10^{-2}}\text{s}^{-1}$$

$$\Rightarrow f = \frac{1}{4}\times 10^2\ \text{s}^{-1} = 25\ \text{s}^{-1} = 25\ \text{Hz}$$

$$T = \frac{1}{f} = \frac{1}{25\,\text{s}^{-1}} = 0.0400\ \text{s}$$

$$k = \frac{2\pi}{\lambda} = \frac{2\pi}{0.320}\frac{\text{rad}}{\text{m}} = 19.6\ \text{radm}^{-1}$$

(b) The standard wave function for a wave in the negative x-direction is [3.4*]:

$$y(x,t) = A\cos\{kx + \omega t\}$$

What happens at $x = t = 0$?

$$y(x,t) = y(0,0) = A\cos\{k0 + \omega 0\} = A\cos\{0\} = A$$

(which was in fact given in the question.)

So for our given numbers,

$$y(x,t) = 0.07\cos\{19.6x + 2\pi\times 25t\} = 0.07\cos\{19.6x + 157t\}$$

Student handouts

EXAMPLE (15.7 from Y&F 13th Edition)

Transverse waves on a string have a wave speed of 8.00 ms^{-1}, amplitude 0.0700 m and wavelength 0.320 m. The waves travel in the $-x$-direction, and at $t = 0$ the $x = 0$ end of the string has its maximum upward displacement.

(a) Find the frequency, period, and wave number of these waves.
(b) Write a wave function describing the wave.
(c) Find the transverse displacement of a particle at $x = 0.360\ m$ at time $t = 0.150\ s$.
(d) How much time must elapse from the instant in part (c) until the particle at $x = 0.360\ m$ next has maximum upward displacement?

a $V = f\lambda \Rightarrow f = \frac{V}{\lambda} = \frac{8.00\ ms^{-1}}{0.320\ m} = 25\ s^{-1}$
$= 25\ Hz$

$T = \frac{1}{f} = \frac{1}{25\,s^{-1}} = 0.04\,s$

$k = \frac{2\pi}{\lambda} = \frac{2\pi}{0.32\,m} = 19.6\ m^{-1}$

b $y(x,t) = A\cos(kx + \omega t)$

Told that $x=0$, $t=0$, y is a maximum.

$y(0,0) = A\cos(0+0) = A\cos 0 = A$

$y(x,t) = 0.07\cos(19.6x + (2\pi\times 25)t)$
$= 0.07\cos(19.6x + 157t)$

University of Glasgow

Things to try

ASTRONOMY & PHYSICS EDUCATION

- Try to visit/find your lecture theatre before your first time using it.
- If possible, trial your kit before your first session just to make sure the room you'll be using has everything you need.
- Use the microphones provided – all centrally controlled lecture spaces should have lapel mics. (Ideal if you tend to wander about during your presentation.)
- Wherever you decide to position yourself in the room make sure you can see a clock!
- Invest in a remote control for your laptop/PC – frees you from the lectern.

Lecture notes

Good practice from https://www.gla.ac.uk/myglasgow/digitalaccessibility/ …

WRITTEN CONTENT

- Clearly structure your notes
- Use the built in styles for headings etc
- Try to keep sentences and paragraphs short
- Sans serif fonts are best (e.g. arial, calibri) and keep to 12pt or above.
- Use double or 1.5x line spacing

University of Glasgow

Lecture notes

ASTRONOMY & PHYSICS EDUCATION

11pt – single spacing

2.2 Conductors, insulators and induced charges

Some materials permit the easy movement of electric charge, whilst others do not. The former are known as *conductors*, the latter *insulators*.

E.g. carpet fibres on a dry day are good insulators. As you walk across the carpet, the rubbing of your shoes on the carpet causes charge to build up on you, and it stays there as it can't flow into the insulating carpet fibres. Touch something conductive, though, such as a metal door knob, and a rapid charge transfer occurs between your finger and the door knob, and you go "Ouch!".

Generally, metals make good conductors, non-metals make good insulators. Conductors have free electrons at the outer edges of each atom, which can move freely through the material. Insulators do not have these free electrons. And then you get semi-conductors, which fall somewhere in between.

2.2.1 Charging by induction

An uncharged metal ball is supported on an insulating stand (Figure 2.2a). Bring a negatively charged rod near it, but NOT into contact with it, and the free electrons in the ball will be repelled by the excess electrons in the rod (Figure 2.2b), creating positive and negative zones within the ball.

Not all the free electrons move to the right surface of the ball. As soon as any induced charge develops it exerts forces toward the left on the other free electrons. These electrons are repelled by the negative induced charge on the right, and attracted to the positive induced charge on the left. The system then reaches an equilibrium state in which the force toward the right on an electron, due to the rod, is balanced by the forces to the left due to the induced charge. Remove the rod again, and the free electrons will shift back again, and we'll get our original neutral situation again.

More efficient for printing

Easier to read and annotate

2.2 Conductors, insulators and induced charges

Some materials permit the easy movement of electric charge, whilst others do not. The former are known as *conductors*, the latter *insulators*.

E.g. carpet fibres on a dry day are good insulators. As you walk across the carpet, the rubbing of your shoes on the carpet causes charge to build up on you, and it stays there as it can't flow into the insulating carpet fibres. Touch something conductive, though, such as a metal door knob, and a rapid charge transfer occurs between your finger and the door knob, and you go "Ouch!".

Generally, metals make good conductors, non-metals make good insulators. Conductors have free electrons at the outer edges of each atom, which can move freely through the material. Insulators do not have these free electrons. And then you get semi-conductors, which fall somewhere in between.

2.2.1 Charging by induction

An uncharged metal ball is supported on an insulating stand (Figure 2.2a). Bring a negatively charged rod near it, but NOT into contact with it, and the free electrons in the ball will be repelled by the excess electrons in the rod (Figure 2.2b), creating positive and negative zones within the ball.

Not all the free electrons move to the right surface of the ball. As soon as any induced charge develops it exerts forces toward the left on the other free electrons. These electrons are repelled by the negative induced charge on the right, and attracted to the positive induced charge on the left. The system then reaches an equilibrium state in which the force toward the right on an electron, due to the rod, is balanced by the forces to the left due to the induced charge. Remove the rod again, and the free electrons will shift back again, and we'll get our original neutral situation again.

12pt – 1.5 spacing

University of Glasgow

Lecture notes – Images

ASTRONOMY & PHYSICS EDUCATION

- Include alternative text with all visuals
- In the alt text briefly describe the image and mention the existence of the text and it's intent
- Avoid using text in images as the sole method of conveying information. If you must use an image with text in it, repeat that text in the document.

University of Glasgow

Lecture notes – Tables

ASTRONOMY & PHYSICS EDUCATION

- Use a simple table structure and specify column header information
- Ensure tables don't contain split cells, merged cells or nested tables
- Don't have any completely blank rows or columns
- Add alt text to your table

Lecture notes – Equations

- Use a proper equation editor
- Be consistent in your use of symbols (e.g. if a variable label from an equation is being defined in a surrounding paragraph, make sure to use the equation editor when typing the label so it looks exactly the same)
- Good practice to number your equations so you can easily refer back to them.

Lecture slides – Content

WRITTEN CONTENT

- Clearly structure your slides – make sure to lay them out in reading order
- Use the built in styles for headings etc

CONTENT

- Use fonts no smaller than 24 pt
- Keep text short and to the point
- Use sufficient empty space
- Avoid using animations
- If using charts, provide alt text

Lecture slides – Images & Tables

IMAGES

- Include alternative text with all visuals
- In the alt text briefly describe the image and mention the existence of the text and it's intent
- Avoid using text in images as the sole method of conveying information. If you must use an image with text in it, repeat that text in the document.

TABLES

- Use a simple table structure and specify column header information
- Ensure tables don't contain split cells, merged cells or nested tables
- Don't have any completely blank rows or columns
- Add alt text to your table

Lecture slides – Videos

VIDEOS

- If embedding video in your presentation, make videos accessible to visually impaired and hearing-impaired users.
- Subtitles typically contain a transcription (or translation) of the dialogue.
- Closed captions typically also describe audio cues such as music or sound effects that occur off-screen.
- Video description means audio-narrated descriptions of a video's key visual elements. These descriptions are inserted into natural pauses in the program's dialogue. Video description makes video more accessible to individuals who are blind or visually impaired.

Lecture notes vs lecture slides

General rule of thumb:

> Very good PowerPoint slides make very poor lecture notes.
>
> Very poor PowerPoint slides make very poor lecture notes too.
>
> Very good lecture notes make very good lecture notes.

- Very tempting to create detailed (i.e. poor) Powerpoints and then just stick them up on Moodle as the notes and call it a day.
- This is not great practice, though when you are short of time, it is better than nothing.
- If you only have time to create Notes or Slides, then detailed slides will do in a pinch, but aim to create detailed Notes to augment them as soon after the lectures as possible.

University of Glasgow

Lecture notes vs lecture slides

ASTRONOMY & PHYSICS EDUCATION

- Deciding what method of delivery you will use should be your first decision.
  - Are you going to use just PowerPoints?
  - Are you going to use just notes/handouts?
  - Are you going to do both?
- No wrong answer – just remember that everything that could be in an exam must eventually end up available on Moodle somehow.

University of Glasgow

ASTRONOMY & PHYSICS EDUCATION

Technological assistance

https://www.gla.ac.uk/myglasgow/training/upskillingsessions/