

# COMS30020 - Computer Graphics

## Introductory Briefing

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# Welcome to Computer Graphics

I'm Dr Simon Lock

You might remember me  
from units such as SPE !



We also have our team of TAs !

# Aim of unit: Introduce "Computer Graphics" !

This term means different things to different people

\*Our\* perspective on the area will encompass:

- Low-level "individual pixel" manipulation
- Drawing primitives (lines and triangles)
- 2D and 3D geometry (numerical position data)
- \*Approximating\* behaviour of light
- Camera views, movement and navigation

As you might have sensed, it's all pretty low-level...  
This is definitely NOT a "Graphic Design" unit !

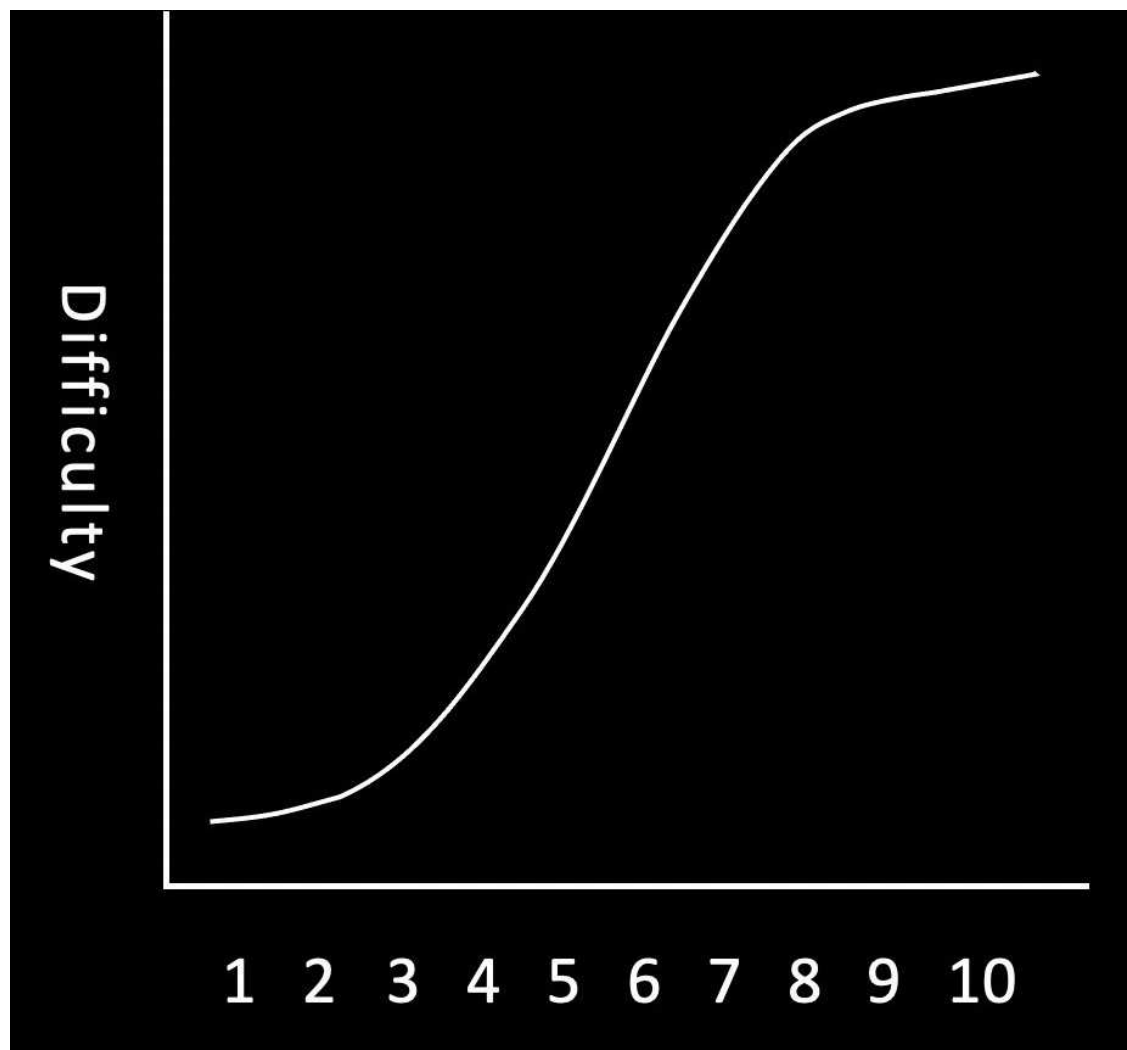
# A Word of Warning !

This unit starts off slowly and very gently :o)  
(to make sure everyone gets off to a good start)

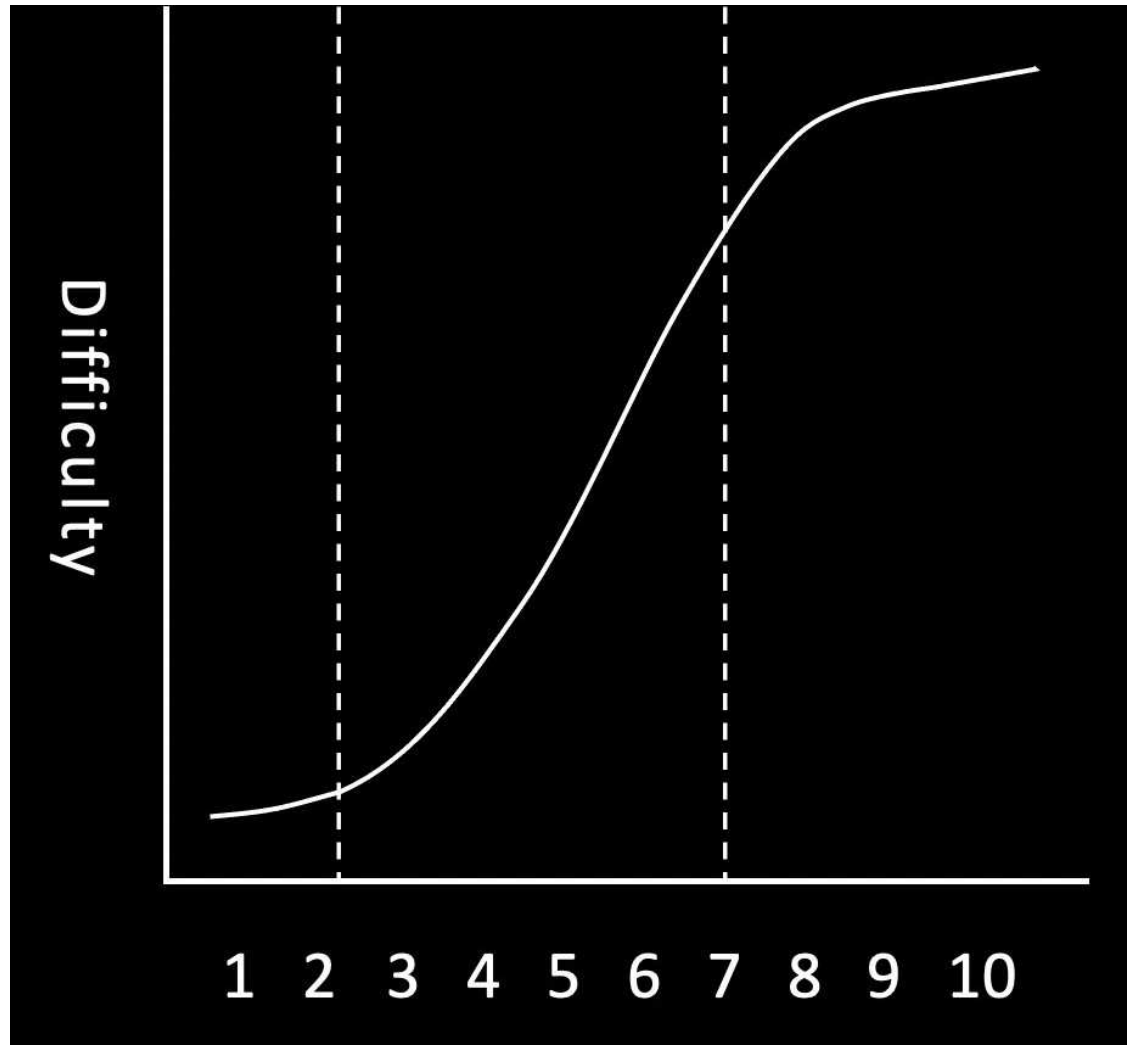
But it will speed up a bit later on  
Don't get left behind - keep your eye on the ball !

It is not particularly hard to pass the unit  
But there are a bunch of fails/resits every year !!!

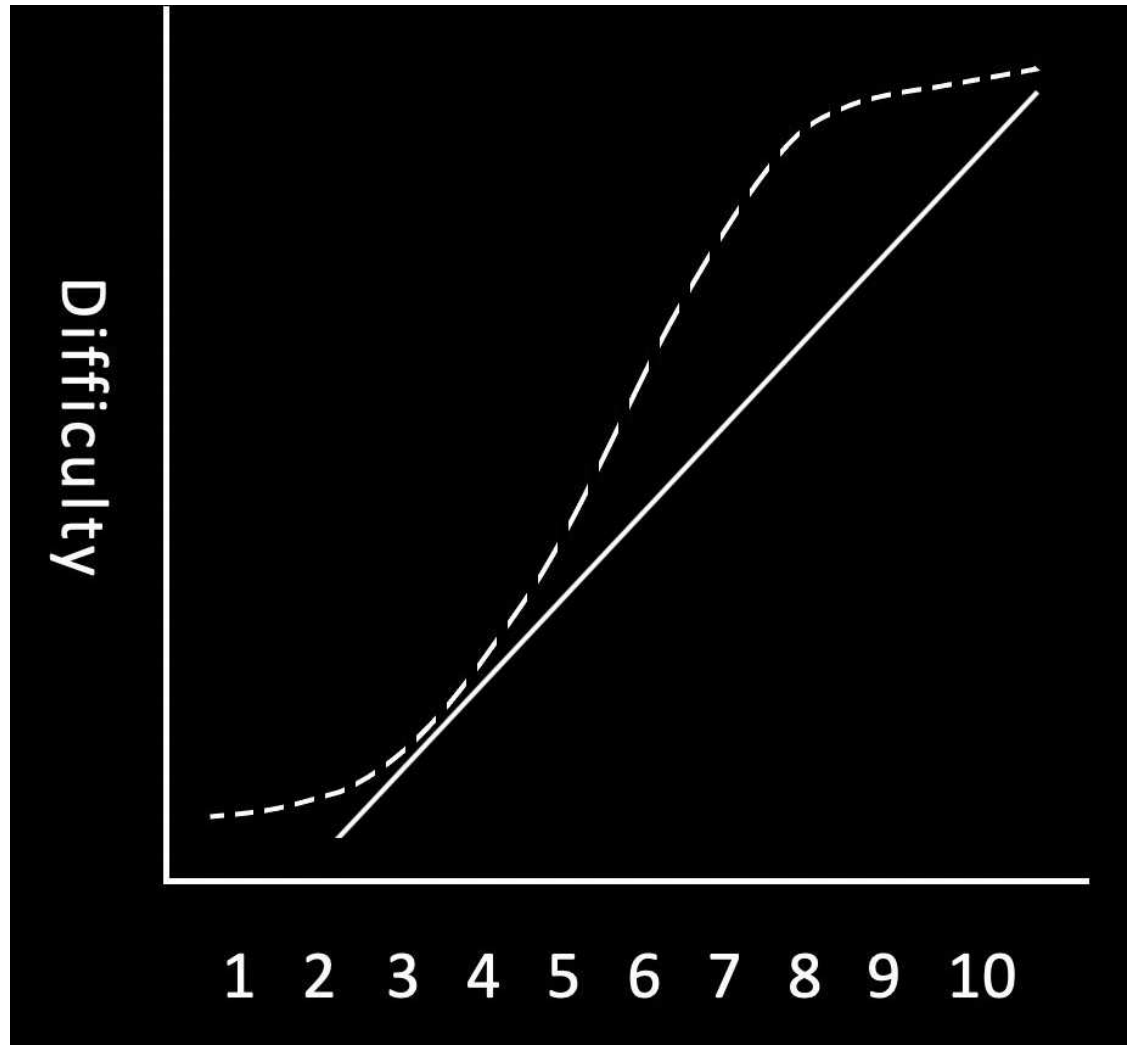
# Learning Curve



# Key Weeks

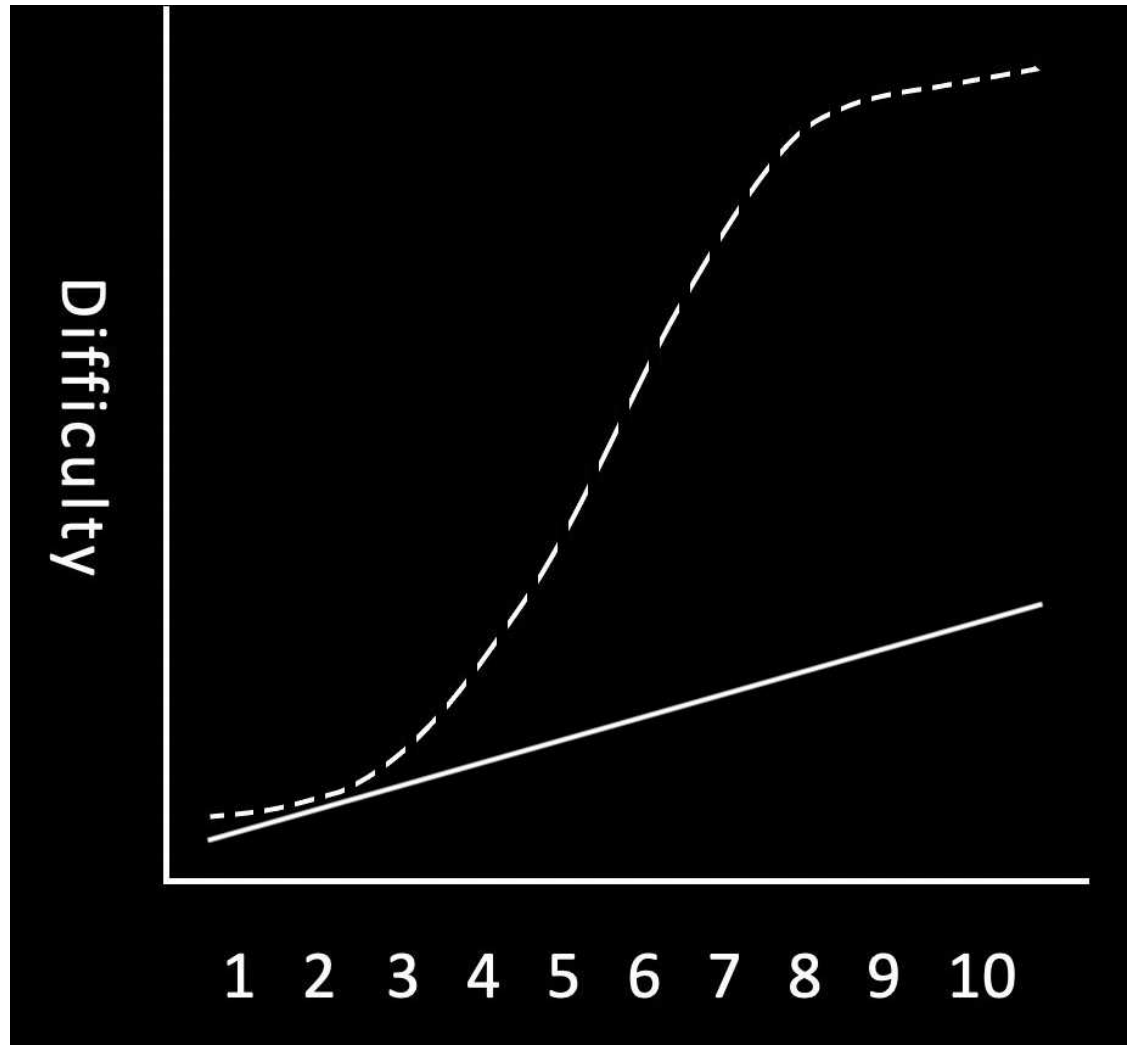


# What people usually do





# What NOT to do



# Weekly Activities

- Each week we'll release a "workbook" of activities  
More on this in some later slides !
- Practical session to support completing workbook  
Monday 1-3pm in MVB 2.11 (this session !)
- Lecture briefing to introduce following week's topics  
Friday at 3pm in Queens Building 1.15 (SLT)
- Q&A opportunity (at the end of the briefing)
- Asynchronous support via Teams discussion forum

# Weekly Workbooks

Each workbook contains a set of tasks to complete  
Lead you step-by-step towards a practical end-goal

Key concepts introduced with rich-media materials:

- Written slides and descriptions
- Recorded audio narration
- 2D and 3D images and diagrams
- Graphical animations (using 3D to teach 3D !)

Workbooks are made available via GitHub  
(For ease of upload and download !)

# Importance of Weekly Workbooks

It is ESSENTIAL that you keep up with practical tasks  
Even if you are taking the "exam only" variant of unit  
Workbooks are backbone of the teaching materials  
They are an integrated bundle of content & activities

# Blackboard

We will use Blackboard as a set of bookmarks  
Pointing to other platforms (GitHub, Teams etc.)

Note that there are 3 pages for this unit !  
("Teaching" page, Coursework Page, Exam Page)  
They generally have identical information on them  
(apart from the "Assessment" pages !)

# Your own GitHub repositories

In the workbooks you will be asked to use GitHub  
Ensure your code is managed throughout the unit

This allows us to monitor everyones progress  
Spot any problems or anomalies along the way

Your repo will feed into 3 week coursework period  
Will be used as part of the final marking process

You won't need to use all the features of GitHub  
Just be able to create repositories, push and pull



# Implementation

We will be using C++ for implementation  
(Pretty much the standard for low-level graphics)

For drawing to the screen, we will use "SDL2"  
Platform independent graphics library, used to:

- Create windows to show on the screen
- Manipulate individual screen pixels
- Allow user interaction via keys and mouse

Everything else YOU will build on top of this !  
(Although we'll use some Maths functions from GLM)



# Suggested Textbooks

Basic introduction to topics covered in unit:

**Computer Graphics from Scratch**

by Gabriel Gambetta

More detailed coverage and advanced rendering:

<https://www.scratchapixel.com/>

You might need to do some additional reading  
(especially for coursework extended topics)

Questions ?

# Why not teach an existing framework ?

One difficulty is choosing which one to teach !

DirectX, OpenGL, Vulkan or proprietary framework ?

Better to teach the fundamental concepts  
(Which make it easy to pick up any framework)

Besides, "fundamentals" are much more "BSc/MEng"  
We don't like to focus a unit around a single API

Can I use <insert\_language>

Soz, no !

C++ is a well-established standard in the area

All templates/examples are written in C++

Teaching assistants are all skilled in C++

It's hard to mark an unfamiliar language

Need to maintain a level playing field !

# Aim of the first workbook

The aim of the first practical session is simple:

To compile and run the "RedNoise" project  
(the base template for all practical exercises)

The deeper purpose is more serious:

Find a "workable" way to compile and run SDL code  
(native OS / virt machine / lab machine / remote login)

Let's take look at that first workbook...

<https://github.com/COMS30020/CG2023>

# Extra Slides

# Nature of Coursework

Your task will be to create a short 3D animation

This is NOT like the CGI unit

(Where it is all about the modelling and design)

This assignment will be much more low-level...

You will NOT be using an existing application

You will build your OWN rendering engine !

Aim of animation: show off features of YOUR engine

More about the assignment when we get to week 8



# Nature of Exam

The exam will be fairly mathematical in nature  
Applying principles of Computer Graphics "on paper"

Essential to complete workbooks and practical task  
(to gain deep understanding of all the techniques)

There won't be a big TA resource during revision  
So don't just leave the workbooks until the end !