



# MODULE INDUCTION

COMP220: Graphics & Simulation



# SESSION AIM

- **Anticipate** the content of the module (topics and structure).
- **Understand** the module aim and learning objectives.
- **Plan** your time management strategies for completing the assignments.

# MODULE AIM

To **research** and **apply** creative computing to the domain of computer graphics and simulations.

On this module, you will **develop your understanding of computing** in more depth through a **greater focus on game engines**. You develop your coding skills in the context of **graphics technologies and pipelines** and gain an understanding of the **operation of simulated virtual environments**. You will engage **practically** and **creatively** to **repurpose** physics processing and graphics rendering pipelines in order to **change their behaviours** and create distinctive visual styles suited to a **specific concept**.

# LEARNING OUTCOMES

ID	NAME	DESCRIPTION	ASSESSMENT CRITERIA CATEGORY
2	Architect	Integrate appropriate data structures and interoperating components into software, with reference to their merits and flaws.	ANALYSIS
5	Research	Develop an argument on a topic using appropriate research methods, primary and secondary sources, and academic conventions.	RESEARCH

# WEEKLY OVERVIEW

Week 1	Week 2	Week 3	Week 4	Week 5	
<b>Overview</b> <ul style="list-style-type: none"> <li>Recap of the graphics pipeline</li> <li>Topics in computer graphics</li> </ul>	<b>Introducing OpenGL</b> <ul style="list-style-type: none"> <li>Setting up the OpenGL framework</li> <li>Drawing a basic primitive</li> <li>Transformations</li> </ul>	<b>Meshes and Shaders</b> <ul style="list-style-type: none"> <li>Properties of 3D geometry meshes</li> <li>Vertex shading in GLSL</li> </ul>	<i>Worksheet development</i>	<b>Materials and Lighting</b> <ul style="list-style-type: none"> <li>Applying textures</li> <li>Using vectors to apply a variety of lighting effects</li> </ul>	* No workshop
Week 6	Week 7	Week 8	Week 9 *	Week 10	Week 11
<i>Studio practice/ mid-term review</i>	<b>Post-processing</b> <ul style="list-style-type: none"> <li>The frame buffer and its uses</li> <li>Creating effects in GLSL</li> </ul>	<b>Simulating Physics</b> <ul style="list-style-type: none"> <li>Rigid body dynamics using the Bullet Physics Engine</li> </ul>	<b>Profiling and Optimisation for Graphics</b> <ul style="list-style-type: none"> <li>The Bullet visual debugger</li> <li>Common bottlenecks in computer graphics</li> </ul>	<b>Rigging and Animation</b> <ul style="list-style-type: none"> <li>Construction and animation of articulated figures</li> <li>Constraints and limits</li> </ul>	<b>VIVA</b>





# TEACHING METHODS

- Lecture (asynchronous)
- Workshop (synchronous)
- Supervisions (synchronous)
- Portfolio development (sync/async)

# TEACHING METHODS

- Lecture (asynchronous)
  - A variable combination of:
    - Short pre-recorded **videos** introducing the topic(s) and/or demonstrating implementations
    - Reading material from **textbooks** or **online sources**
    - External videos or other material
  - Spend approx. 1h per week familiarising yourself with the content **before attending the timetabled sessions!**
- Workshop (synchronous)
- Supervisions (synchronous)
- Portfolio development (sync/async)

# TEACHING METHODS

- Lecture (asynchronous)
- Workshop (synchronous)
  - 2-hour online synchronous activity as a [timetabled Teams Meeting](#).
    - Recorded content will be posted on LearningSpace afterwards.
  - Focus on [practical](#) methods for [implementing](#) techniques relevant to the week's topics.
  - Opportunity for [support/Q&A](#) on any of the lecture material or with the worksheets.
- Supervisions (synchronous)
- Portfolio development (sync/async)



# TEACHING METHODS

- Lecture (asynchronous)
- Workshop (synchronous)
- Supervisions (synchronous)
  - Weeks 2 (proposal review), 5, 8.
  - 1-hour Teams Meeting in small groups with your tutor.
  - To review and discuss your artefact plans and progress.
- Portfolio development (sync/async)

# TEACHING METHODS

- Lecture (asynchronous)
- Workshop (synchronous)
- Supervisions (synchronous)
- Portfolio development (sync/async)
  - To **support** your work for Assignment 2 – **technical report**
  - 1-hour **synchronous** activity as a **timetabled Teams Meeting**.
  - 1 hour of **asynchronous independent work** to present before the next session.

# ASSIGNMENTS

- Assignment 1: Artefact Worksheets [50%]
  - **Four** worksheets (roughly one every two weeks)
    - Worksheets 1-2: build the **framework** that forms the foundations for your **artefact**
    - Worksheets 3-4: **plan**, **implement** and **refine** your chosen graphics/simulation techniques
- Assignment 2: Technical Report [50%]
  - Produce a **web page** and a **poster** to **report the outcome** of **practice-based research** related to the **technical architecture** of your artefact
- See [LearningSpace](#) for assignment briefs, worksheets and formative deadlines
  - Submit **pull request to Bitbucket** before the deadlines for formative feedback
- See [MyFalmouth](#) for summative deadline

# WORKSHEET SCHEDULE

Week 1	Week 2	Week 3	Week 4	Week 5
Overview	Introducing OpenGL	Meshes and Shaders	<i>Worksheet development</i>	Materials and Lighting

Proposal	Worksheet 1: framework	Worksheet 2: basic scene
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Week 6	Week 7	Week 8	Week 9 *	Week 10	Week 11
<i>Studio practice/ mid-term review</i>	Post-processing	Simulating Physics	Profiling and Optimisation for Graphics	Rigging and Animation	VIVA

Worksheet 3: plan/prototype	Worksheet 4: implementation	Refinement
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Posters

# NOW WHAT...

- Take a look at the **content for Week 1** on LearningSpace for an introduction to some of the topics relevant to computer graphics and simulation.
- Watch the Assignment Overview videos (in the [Assessment section](#) on LearningSpace) to learn more about the artefact you'll be creating for your assignment.
- Start to think about which **techniques** you'd like to implement, and **prepare your proposal** to present in **Week 2**.