

The background of the slide is a composite image. On the left, there are several rolled-up architectural blueprints showing floor plans with various dimensions and labels like '5', '6', and '1010'. On the right, there is a dark grey area with faint, light blue circular technical diagrams, including a circular scale with numbers from 130 to 210 and a circular arrow indicating a cycle.

# INTEGRATED SYSTEM DESIGN PROJECT M

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# Aim

- To work as a team in order to complete an engineering project.
- The project will involve designing an integrated system that meets a particular set of engineering requirements.
- Specific details are covered in the course document (Moodle).



# The Projects

- Future Transport in Glasgow
- Decarbonise the University of Glasgow
- Develop a UofG brewery
- Build Scottish Biodiversity
- A Floating Village

格拉斯哥未来交通  
格拉斯哥大学脱碳  
开发UofG啤酒厂  
建立苏格兰生物多样性  
一个漂浮的村庄





# 1. Future Transport in Glasgow

Glasgow City Council recently commissioned a Connectivity Commission to look at the current state of transport in Glasgow and then come up with a series of recommendations. These recommendations will form the basis of Glasgow's future transport strategy, facilitating low carbon and low-cost movement of people and goods through the city.



- Examine the recommendations of the [Connectivity Commission](#)
- Identify key engineering challenges
- Work as a team to produce a plan which solves those engineering challenges.
- Consider:
  - The costs of your engineering solution compared with benefits to the city
  - The wider political and social impacts of your project as well as those wider barriers to completing your project

## 2. Decarbonise The University of Glasgow

The University of Glasgow aims to significantly reduce the carbon footprint of its energy consumption. The University is research-intensive with high energy demands but exists within a space-constrained city centre campus. Lowering our energy demand and supplying energy from renewable and low-carbon sources is particularly challenging.

- Work to understand the energy consumption of the university as a whole.
- Create a detailed plan for reducing the associated emissions as low as possible by 2030.
- Identify and address key engineering challenges
- The group can consider options to...
  - reduce the amount of energy consumed
  - optimise activities in the university to facilitate reduction and reuse of energy waste
  - consider technologies for low carbon energy generation on site.





### 3. Develop a UofG brewery

As part of the redevelopment of the old Western Infirmary site, The University of Glasgow would like to build a brewery. The brewery is to will act as both a teaching resource (for a new course in brewing science) and as a small-scale commercial entity (selling beer to the student unions in order to offset the cost of its construction and day-to-day operations).

- Study the current Western Infirmary site expansions plans of the University
- Create a plan to construct a brewery on the site, including all of the appropriate equipment, space, water supplies, etc. required for such a venture (the size and scope is up to you and should be balanced between its need to operate as a teaching site while also producing enough beer to pay for itself over its lifetime).
- **Identify and address key engineering challenges (you can choose to concentrate on one particular challenge given this the project has many potential challenges to tackle).**
- Consider how to meet the power demands of the brewery via low carbon technologies.
- Consider how the brewery waste products are responsibly dealt with.





## 4. Build Scottish Biodiversity

Biodiversity—the variety of living things—is important for creating healthy, and resilient habitats. However, as outlined by NatureScot's 2019 [State of Nature report](#), biodiversity has been declining due to a number of factors, ranging from urbanisation to climate change.

Your group will:

- Identify a specific habitat where biodiversity is being lost, and how it is being lost
- Identify the key drivers of these changes
- Generate engineering solutions to address this biodiversity loss
- Consider a broad range of factors in developing your solutions—such as feasibility and societal impact—and accordingly, deploy a range of engineering skills from the group
- This project is designed to give the group the flexibility to address a biodiversity challenge of interest to them. You may choose to focus on a single issue affecting your chosen habitat, or consider multiple issues in parallel.





## 5. A Floating Village

Global warming is making the sea level rise and some islands in Scotland will see their habitable surface reduced. Devise a plan for creating a small-scale floating “village” trial off the coast of Scotland. It is your chance to come up with innovative, ground-breaking engineering ideas for a green, sustainable city.

Your group will consider:

- Where and how you will build the city from a structural point of view, as well as an architectural perspective.
- How you will make sure that the plan is sustainable, both from an environmental and economical point of view
- What the optimal size of the city and number of habitants will be (which will inform the city's energy requirements)
- How to connect the city to the mainland
- Generate engineering solutions to address one of the above considerations (you can choose to concentrate on one particular challenge given this the project has many potential challenges to tackle).





# So, what do you have to do?

- Get into your teams
- READ THE PROJECT BRIEF DOCUMENT
- Pick a project
- Assign roles for each team member
- Investigate the various technological/engineering options that could meet your needs.
  - Efficiency
  - Cost (construction, maintenance, decommissioning)
  - Impact (human, environmental etc.)
  - Sustainability
  - Ease of construction
  - Location of construction
  - Planning approval / local council regulations
- Produce a report based on your investigation - A report that takes into account all of the factors above and presents the most logical solution to the engineering challenge.

# Be creative

- There is no one 'right' answer to these projects
- Each project will be unique
- Make it interesting – investigate novel solutions



# Communication & Management

- Effective team work requires good communication between team members.
- Share ideas.
- Help each other
- Plan for deadlines
- Tell other members if you cannot attend meetings.
- Spend some time in the first meeting getting to know each other.

# Mentors

- Each group has been assigned a PhD student Mentor.
- The mentors will help you organise your work, manage disputes, manage your time, etc.
- They are your first point of contact for questions



# Assessment

- Options appraisal presentation (recorded video), 20%
- Final report, 60%
- Peer assessment, 20%

# Timetable and meeting info

- Week 2-3: 10 minute catch up with academics (if requested)
- Feb 3<sup>rd</sup> : submission of option appraisal presentation
- March 31<sup>st</sup> : Submit final written report and peer review

As a group, you should plan and coordinate your own meetings.

You should arrange for your mentors to be at these meetings.

Groups should request meetings with the lecturers as and when they need them.

The organisation of this course is up to you.