

2E9 ENGINEERING DESIGN III: GIVE ME SHELTER [10 credits]

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Module organisation

The design and build shelter module runs throughout the second semester consisting of a design and build exercise. The module has a weekly lecture and a three-hour design workshop. For the design workshops, the class is divided into typically twenty design groups comprising up to ten students. The module will utilise engineering and environmental theory covered in modules 2E4 Solids and Structures, 2E7 Engineering and the Environment and 2E8 Materials.

Stage One: Design

The design groups are required to interpret the design brief and develop a workable creative solution for a temporary shelter. As part of the design assignment, group members are required to deliver the following items: each member of the design group is required to keep an individual bound design journal. The journal will be a record of each individual's efforts to carry out research into the design and construction of shelters along evidence of original ideas and thought. Each design group is required to submit a group design report on the preliminary design solution(s) along with a poster presentation. The group design report will cover the following issues:

- review of iconic and everyday designs for shelters paying attention to form and function;
- review of the published design processes and methodologies for built environment and products;
- review of user-centred design and its applicability to this design brief;
- review of environmental and sustainability criteria for temporary shelters including recycling and carbon footprint;
- drawings and calculations.

Following submission of the Group Design Report and poster presentation, designs will be selected for construction later in the Semester.

Stage Two: Construction

The ten selected designs from stage one will be constructed during a single day in the penultimate week of semester. Prior to construction, the preliminary designs will be reviewed and changed as necessary with respect to the buildability and sustainability of the proposed solution, e.g. choice of materials, construction sequence, design of joints, estimated cost. All students will participate in the construction stage with the groups who were not selected becoming part of the shortlisted design groups. The groups will be assessed on their ability to translate the

design into construct whilst taking account of the robustness of the finished shelter and project management throughout the day. At the end of the construction day, each group will be given a verbal report on the construction by a panel of judges. A prize for the best shelter will be given to the winning group.

Prior to construction, each group will be required to submit a group construction report covering the following issues

- Organisation Management Chart
- Design Review
- Modified Construction Drawings
- Bill of Quantities
- Construction Sequence including a Gantt Chart
- Health and Safety
- Strategy for Recycling and Re-use

The Organisation Management Chart should clearly show:

- What is the organisation of the group?
- What are the tasks?
- Who is leading the tasks?
- Who is working on the tasks?
- What are the milestones and deliverables at different points in the construction process?

Learning outcomes

Upon completion of this module, students will be able to:

- interpret a design brief that meets the needs of a well-defined specification;
- be part of a group either as the group leader or a group member and work on a multi-disciplinary project with a fixed deadline;
- define a design problem and carry out the necessary analysis and calculations;
- communicate the design using design statement, engineering drawings, calculations, bills of quantities, and an oral presentation;
- project manage the construction of a shelter and overcome practical problems ;
- design and build a) temporary demountable and adaptable structure, understand health and safety issues associated with construction projects and prepare a health and safety plan;
- understand recycling strategies and elements of sustainable design.

Teaching strategies

In addition to the 2E4 Solids and Structures, 2E7 Engineering and the Environment and 2E8 Materials modules, weekly lectures and design workshops will held in the following areas:

- Structures and Design
- Stakeholder Engagement
- Sustainability
- Health and Safety
- Project Management

Assessment

There is no formal end-of-year examination in this module but all students must achieve an overall mark of at least 40% to pass. The marks for this module will be presented at the Court of Examiners' meeting for approval in the normal way. The overall mark is calculated using the following combination of group and individual assignments. Each group report should clearly show on the inside page a percentage break down about which group members contributed to different chapters of the report.

Group Assignments (70%)

- Week 6: Group design report (20%)
- Week 7: Poster presentation for preliminary design (10%)
- Week 10: Group construction report (20%)
- Week 11: Site construct (10%)
- Week 12: Video (10%)

Individual Assignment (30%)

- Week 2 to 12: Design Journal (30%)

Recommended textbook

Further to the references on the 2E4 Solids and Structures, 2E7 Engineering and the Environment and 2E8 Materials modules, please refer to the following text:

- *Tony Hunts Second Sketch Book*
- *Tony Hunts Structures Notebook*

http://www.4shared.com/office/kZD2ToDP/Tony_Hunts_Structures_Notebook.html

Further information

www.webct.tcd.ie

<http://www.tcd.ie/Engineering/undergraduate/baiyear2/2E9>