

ES3G2-15 Steel Structures Design

27/28

Department

School of Engineering

Level

Undergraduate Level 2

Module leader

Elia Gironacci

Credit value

15

Module duration

25 weeks

Assessment

30% coursework, 70% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

ES3G2-15 - Steel Structures Design

[Module web page](#)

Module aims

The appraisal and design of structures is the main activity of many professional civil engineers. Study of the structural behaviour, analysis and design of steel structures is therefore a principal part of civil engineering teaching and is essential for professional accreditation. Structural engineering is a substantial economic activity.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Introduction to steel structures: Structures for buildings and bridges and the design process: types and forms of structure; load paths; choice of structural materials (steel grades); design of individual members

and connections;
influence of imperfections, design for construction methods; H&S issues (e.g. CDM 2014); sustainable construction
and the client's view. Eurocode system for limit state design: loads and load combinations and arrangements; ULS
(resistance) and SLS; (deflections and vibration), robustness (Building Regulations), frame stability, fire design and durability.

Plastic collapse analysis: ULS for members and frames, to limit analysis, mention of shakedown; interpretation of results for the design process. Geometric properties of steel sections.

Design process: Tension struts, Local buckling and classification, Laterally-restrained beams; (bending moment and shear), Uniform and non-uniform torsion: Unrestrained and restrained warping, Laterally-unrestrained beams - lateral torsional buckling, Column members; buckling curves; interaction of bending and axial compression.

Introduction to Connections and Joints, and flooring systems.

Overall stability of frames: Second-order P- effects; elastic critical buckling loads and beam-column members. Design process: cr and Merchant-Rankine formula modification.

Learning outcomes

By the end of the module, students should be able to:

- Critically understand the function of structures as load-bearers and the response of members, joints and frames to guarantee structural integrity and safety.
- Propose concepts for common civil engineering structures of steel, particularly those related to buildings.
- Analyse common building structures to determine response to load.
- Determine form and size of structural elements by preparing adequate drawings and comprehensive structural calculations.
- Appraise different structural solutions to consider client and design requirements and examining critically the results of structural analysis.

Indicative reading list

[Reading lists can be found in Talis](#)

[Specific reading list for the module](#)

Subject specific skills

Design, make and break activities, visit, lectures, examples classes and webinars.

Transferable skills

No transferable skills defined for this module.

Study

Study time

Type	Required
Lectures	21 sessions of 1 hour (14%)
Practical classes	2 sessions of 1 hour (1%)
Fieldwork	2 sessions of 1 hour (1%)
Work-based learning	70 sessions of 1 hour (47%)
Other activity	10 hours (7%)
Private study	45 hours (30%)
Total	150 hours

Private study description

45 hours of guided independent learning (including VLE use and support from Employer)

Other activity description

8 hours of examples classes
2 hours of revision classes

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group D5

	Weighting	Study time	Eligible for self-certification
Assessment component			

	Weighting	Study time	Eligible for self-certification
Written report	30%		Yes (extension)
Laboratory written report (maximum length 6 pages)			

Reassessment component is the same

Assessment component

Online Examination	70%	No
QMP		
~Platforms - AEP,QMP		

- Online examination: No Answerbook required

Reassessment component is the same

Feedback on assessment

Coursework: individual and cohort level feedback.

Feedback in examples class.

Model solutions to recent past papers.

Cohort level feedback on examination.

[Past exam papers for ES3G2](#)

Availability

Pre-requisites

Materials for Net-Zero

Structural Analysis

Courses

Course availability information is based on the current academic year, so it may change.

This module is Core for:

- Year 3 of DESA-H221 Undergraduate Civil and Infrastructure Engineering (Non-integrated

Degree Apprenticeship)