

Assignment Title:	Assignment 1 – Reinforced Concrete Column Design to EC2
Assignment Type:	Summative
Assignment Weighting	25% of Module
Word Limit	No limits
Set Date	17 <sup>th</sup> February, 2026
Submission Date:	1 <sup>st</sup> March, 2026**
Submission Method:	Gradescope
Feedback Date:	21 <sup>st</sup> , April, 2026**
Type of Feedback:	General/Individual Written feedback

## Rationale

Coursework 1 relates to the design of a Reinforced Concrete slender column. This is self-taught exercise, designed to assess independent learning. You are first required to read the handout on R.C column design to EC2 (based on the guidance provided by Mosley, Bungey and Hulse) provided on Minerva. Independent learning is an essential learning outcome for Masters level students as defined in UK-SPEC. UK-SPEC defines the Engineering Council's requirements for engineering Master's graduates in the UK.

## Learning outcomes being assessed

Understand and apply the design guidance used in current codes of practice for the design of slender reinforced concrete columns.

Apply a comprehensive knowledge of mathematics, materials and their behaviour, and engineering principles to the solution of complex reinforced concrete design and analysis problems.

Formulate and analyse complex structural engineering design problems to reach substantiated conclusions. This will involve evaluating available data using fundamental engineering principles and judgment (both existing and new) to work with information that may be uncertain or incomplete and discussing the limitations of the techniques employed. Select and apply appropriate computational and analytical techniques to model complex reinforced concrete design problems and discuss the limitations of these techniques.

Evaluate the environmental and societal impact of solutions to complex design problems, optimising the design solutions to minimise these adverse impacts.

## Assignment Guidance

- Coursework 1 is a MAJOR item of coursework and must be submitted to the School in the usual way on or before **TBC**. (Note: any special arrangements for the submission of coursework previously agreed with part-time students will also apply to this work).
- Assessment No.1 is on R.C Column Design to EC2. This is worth up to 25% of the total mark awarded for Advanced Concrete Design.
- **Each Coursework must be submitted separately** with the School's standard cover sheet for a MAJOR item of coursework. This coursework sheet must also be included as part of the submission.
- Feedback on your performance will be given in the form of brief general comments to the cohort plus a mark for each item of work. These will be issued on **TBC**.

## Assessment Criteria and process

1. Having read the design guidance (provided separately), you are to design a symmetrically reinforced concrete column to carry the following design ultimate load effects:
  - Axial Load = 1950 kN
  - End moment at top of column = 105 kNm
  - End moment at base of column = 0
  - Bending is about one axis only (i.e. the column is not subjected to biaxial bending).
2. The column is to be designed to comply with the requirements of BS EN 1992-1-1 (EC2).
3. It may be assumed that the column does not experience any sway effects. The effective heights of the column can be taken as 7.5m about both axes (i.e.  $l_{ey} = l_{ez} = 7.5\text{m}$ )
4. You may assume that the creep coefficient,  $\phi_{ef} = 0.9$ .
5. You are to make reasonable assumptions about any material parameters used in your design. **Please note that any such assumptions must be clearly stated in your design calculations.** It is entirely up to you to decide on the cross-sectional dimensions of the column and the area of reinforcement. **You are required to produce a design that is sustainable and also considers economy, buildability, durability and safety (under all credible situations).**
6. It is likely that you will consider more than one size of column for this exercise to be able to demonstrate that your final design satisfies the requirements in Point 5 (you need to define what you mean by sustainable, economic etc). If this is the case, you are required to

submit the full calculations for only one set of cross-sectional dimensions, however, you may include the results for other cross-sections you have considered (but not full sets of calculations for each case). However, these results must have sufficient detail to confirm that the additional calculations have been completed.

7. Your calculations should be supported by good quality hand drawn sketches where appropriate. **In addition**, at the end of your calculations, you are required to present an elevation of the column (giving an indication of its location and relationship to the horizontal spanning elements) you have designed **and** a number of cross-sections showing the layout of any reinforcement (including links); the cover to the reinforcement and the main dimensions must be provided. Either good quality hand drawings or AutoCAD drawings will be acceptable for these elevation and cross sections.

Coursework Assessment Grid – Assignment 1 (Column Design)

Criteria	<39%	40 to 49%	50 to 59%	60 to 69%	>70%
<b>Technical Design Knowledge and Understanding</b>		Some understanding and knowledge of relevant subject matter; incomplete or missing consideration of the required design parameters.	Basic understanding and knowledge of relevant subject matter. Able to estimate errors/accuracy of methods used. Can evaluate and derive information from data to produce coherent solutions. Incomplete consideration of the required design parameters.	Good understanding of the essence of the problem, its relevance and its context. Able to estimate errors and validate accuracy of the results produced. Can critically evaluate and interpret the results and relate them to published evidence to draw robust solutions. All design parameters considered.	Comprehensive and detailed understanding of the problem. Able to frame this in a novel or innovative way based on past work in the field. Able to clearly estimate errors and clearly validate accuracy of the results using appropriate methods. Can critically evaluate methodology used, interpret the results and relate them to published evidence and consider the results in a broader context to draw robust solutions. All design parameters considered and referenced
<b>Design Methodology (Methods / Techniques)</b>		Used a basic and familiar approach for the project leading to a routine solution which was partially incomplete or incorrect. (Decisions were not supported by acceptable reasoning.)	Used a basic and familiar approach for the project leading to a routine solution. Able to conduct a prescribed approach to the problem.  The methods / techniques adopted were appropriate	Can develop and clearly justify a scheme for solving unfamiliar engineering problems. Able to select an appropriate approach to solve the problem.  The methods / techniques were both appropriate and of an advanced level.	Can develop and clearly justify innovative scheme for complex engineering problems. Able to both select and adapt an appropriate approach to the problem. There is a high level of confidence in the potential to obtain quality results.  The methods / techniques were detailed, appropriate, sophisticated and either

					novel or applied in a novel fashion
<b>Sustainability (Alternative Designs)</b>		Basic consideration of alternative designs using only 1 parameter.	Good consideration of sustainability within the field of reinforced concrete design.	Very good consideration of sustainability within the field of reinforced concrete design.	Excellent consideration of sustainability within the field of reinforced concrete design, with the alternative designs based on several relevant and industry recognised parameters.
<b>Independently Search for and Evaluate Published Sources of Information</b>		Can search for both academic and other information relevant to the problem, however, the search is incomplete/a minimum.	Can search for both academic and other information relevant to the problem, with some evidence of critical engagement.	Can search for both academic and other information relevant to the problem, independently evaluate it in a critical fashion and identify knowledge gaps.	Can initiate and undertake searches for both academic and other information relevant to the problem. From a critical evaluation of this material can recommend actions based on knowledge gaps.
<b>Layout and Presentation</b>		The problem was communicated, however, the clarity of some areas of the communication were questionable.	Able to clearly communicate the problem in an effectively structured written technical format using appropriate IT techniques. Appropriate use of figures. Avoids plagiarism.	Able to clearly communicate the problem in an effectively structured written technical format using appropriate IT techniques and correct formatting of calculations. Appropriate use of figures. Avoids plagiarism.	Able to communicate the problem in a targeted, focused manner, using appropriate IT techniques and correct formatting of calculations. Figures clearly selected to enhance the arguments. Avoids plagiarism.
<b>Drawings</b>		Engineering drawings were incomplete/incorrect – insufficient sections were provided. Sketches within the calculations were incomplete/incorrect. Problems observed re scales, line thicknesses etc.	A basic set of engineering drawings were provided, however, the drawings suggested an inability to communicate the design with sufficient detail.	All drawings correctly supported the design calculations. Drawings consisted of sketches within the calculations and a set of engineering drawings (hand or computer) which cross-referenced themselves and were referenced within the	All drawings correctly supported the design calculations. Drawings consisted of sketches within the calculations and a set of engineering drawings (hand or computer) which cross-referenced themselves and were referenced within the

				calculations. Minimum errors.	calculations. The set of engineering drawings were of a professional level.
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## Academic misconduct and plagiarism

students are part of an academic community that shares ideas and develops new ones. You need to learn how to work with others, how to interpret and present other people's ideas, and how to produce your own independent academic work.

It is essential that you can distinguish between other people's work and your own, and correctly acknowledge other people's work.

All students new to the University are expected to complete an online Academic Integrity tutorial and test, and all students should ensure that they are aware of the principles of Academic integrity.

When you submit work for assessment it is expected that it will meet the University's academic integrity standards.