

ENGINEERING DESIGN (CODE)

External Assessment Specifications inform the development of external assessments. The primary audience for the written examination specification is the course Setting Examiner and Exam Critics. It may also be of use to teachers and students. The primary audience for the Folio, Oral or Practical guidelines is teachers and students. These documents also inform the external assessment structure in TASC's reporting, assessment, and certification system, TRACS.

The external assessment specifications are to be read in conjunction with the course document and will not repeat essential information found in other documents.

The external assessment for this course consists of **one (1)** component:

- **A Folio consisting of:**
 - Extended Design Project

The Criteria to be externally assessed are:

Folio:

- Criterion 1: apply critical and creative thinking to the design of a solution(s)
- Criterion 2: apply an iterative design cycle to develop engineering design solutions
- Criterion 4: use success criteria to review, reflect and refine the design process and make justified recommendations
- Criterion 5: use oral and written communication for technical and non-technical audiences
- Criterion 8: analyse the interrelationships between engineering projects and society

FOLIO STRUCTURE

Folio Components	Extended Design Project
Criterion/Criteria	Criterion 1 Criterion 2 Criterion 4 Criterion 5 Criterion 8
Examinable Elements	Criterion 1: All elements Criterion 2: Elements 1, 2 and 4 Criterion 4: All elements Criterion 5: All elements Criterion 8: All elements
Course coverage	All modules for Criteria 1, 2, 4 and 5 Module 3 focus for Criterion 8
Prescribed texts coverage	n/a
Response format	Multimodal (digital) and word processed
Number and nature of components	Nine components comprising: <ul style="list-style-type: none"> • Title page • Design Brief • Production proposal • Research • Design Development • Design Production • Final Design - Resolved engineered solution (product, service, environment) • Evaluation and recommendations

	<ul style="list-style-type: none"> References
Compulsory or optional	All components are compulsory
Total time allocation	Maximum 50 hours of dedicated class time including internal and external components
Total word count	<p>Maximum of 40 A4 equivalent pages (includes research, evidence of planning, concept sketches with annotations, photographs, charts/diagrams, etc).The file size must be no larger than 100 megabytes in total.</p> <p>Includes a 1500 – 2000 word processed research essay</p>
Mark / Rating allocation	<p>Extended ratings of:</p> <p>A+, A, A...B+, B, B-...C+, C, C-...t+, t, t- or z for each Criterion 1, 2, 4, 5 and 8</p>
Mark / Allocation reasoning	Alpha marking is appropriate for the qualitative nature of the course.

FOLIO GUIDELINES

These guidelines provide comprehensive details for students, teachers and markers about what component/s form the external assessment for this course.

The [TASC Frequently Asked Questions – Externally Assessed Folios](#) provides general information for all students and teachers about externally assessed folios, including a *how-to guide* for submitting folios and a link to the [TASC Academic Integrity Guide](#).

The course Assessment Report available under the *Supporting Documents* section of the [<CODE> course page](#) addresses issues, strengths, and weaknesses about the previous year's assessment of the folio and should be read in conjunction with the guidelines.

Markers will use marking guidelines to mark the Folio. TASC would strongly encourage teachers to use the marking guidelines to assess the projects internally.

The final Folio must be electronically submitted by the student to their teacher for external assessment by the *due to teacher date* published on the [TASC website](#) each year.

The teacher cannot extend the published *due to teacher date*, however they may set an earlier deadline for the purpose of internal assessment.

ADVICE TO STUDENTS

You are required to submit a folio (extended design project) of your work consisting of:

1. A title page
2. A design brief
3. A production proposal
4. Research
5. Design Development
6. Design Production
7. A resolved engineered Final Design solution (product, service, environment)
8. Evaluation and recommendations
9. A list of References

TASC will assess the Folio to determine the course external assessment rating for Criteria 1, 2, 4, 5 and 8. If you do not submit a folio you cannot achieve more than a Preliminary Achievement (PA) for this course.

Extended Design Project

When producing your Folio (Extended Design Project), the following points must be noted:

- Develop and provide a clear, concise brief and production proposal.
- Follow a structured *engineering* design process as is typically applied in a professional setting

- o Note: It is essential that you provide evidence of design development through scanned sketches/screen shots, embedded images that show exploration and experimentation of potential design solutions through to the final solution.
- Include a research analysis essay (1500 – 2000 words).
- When choosing the subject of your design project you **must** identify a potential user or client and take into account existing products and practice, social, ethical, economic and environmental issues and professional standards.

You must justify your choice in the documentation of the design process and your teacher must approve it.

Title page

The title page must include:

- the project title and candidate's TASC ID number
- Project team details (TASC ID numbers) if relevant.

Design Brief

The design brief includes analysis of engineering design problem and background information connected to the identified need of the project's design intention:

- statement of problem(s)
- description of main aims(s) and objectives(s)
- the potential user, target audience or intended client
- constraints, and limitations
- identification of success criteria.

Production Proposal

The production proposal includes:

- design specifications
- resource requirements (materials, components, tools, equipment, etc.)
- risk assessment
- budget/costing

Identification of potential collaborations Research Analysis

This is an integral part of the engineering design process. Research provides a window to essential information about important aspects of the brief, the investigation of materials and components and existing solutions that guide the functional intentions, understanding of professional standards, identify the STEM concepts and processes to inform the design development of the project.

This includes:

- review of previous work/research and relationship to current project
- evidence of stakeholder engagement
- technological, scientific and mathematical concepts to interpret problems and to inform and support decisions
- identification of professional standards in relation to ethics in engineering design practice and consumer rights
- social, ethical, economic and environmental issues related to technology, materials selected, processes used, and solution design.

This research analysis must demonstrate a direct connection to the project's development and be referenced appropriately.

Design Development

The design development must include articulation of the engineering design process (diagrams, sketches, photographs, annotations):

- Ideation
- Consideration of alternative solutions and reasons for selection
- Production drawings and plans

Planning and design ideas are to be analysed to articulate the positive and negative aspects of each when assessed against the design brief and needs.

Design Production

The design production must include:

- photographs/screen grabs and supportive annotations that explain the project production process used to generate your design context. This will help to prove the project is your original work
- prototype(s) development and selection.

You must include testing methods and/or methods for obtaining stakeholder feedback:

- Testing methodology/experimental design
- Evidence of data collection and data analysis.

You must describe how prototyping and testing are to be used to articulate the positive and negative aspects of each when assessed against the design brief and needs.

- Refinement of solution

Final Engineered Design – resolved engineered solution (product, service, environment)

The final design should be a suitably resolved engineering design solution that addresses the project's success criteria. The final design should include:

- annotated photos
- video file (voice over or annotation of key features)

Evaluation and recommendations

This section should:

evaluate against project's stated purpose and needs

reflect on what has been achieved and also what may not have been achieved

offer recommendations for further research/testing/improvements/redesign.

References

This section should include:

- all in-text referencing
- a reference list.

Folio length and word count

- Maximum of 40 A4 equivalent pages (includes research, evidence of planning, concept sketches with annotations, photographs, charts/diagrams, etc.). Folios that exceed the 40-page limit will only have the first 40 pages assessed.
- Include a 1500 – 2000 word processed research essay
- Be no larger than 100 megabytes in total size.

Presentation of Folio

When presenting your folio the following points must be noted:

- be a single coherent folio presentation
- not exceed a maximum equivalent of 40 A4 pages with text no smaller than 10 point for body text and not a series of separate files. Not included in this maximum limit:
 - a cover page (containing the inquiry question and the candidates TASC ID number only)
 - References.
- Be no larger than 100 megabytes in total size.

Students must complete and submit the Student Folio Declaration available on the TASC website for teachers before the project is submitted. Teachers will hold the declaration and will be asked to provide to TASC if required.

The folio must be submitted via TRACS. All components of the folio will be submitted as one complete

electronic document.

Referencing

- For this course American Psychological Association (APA) is the preferred style.
- Regardless of the formal referencing style chosen, you must consistently use a single referencing style in all components of your folio.
- Refer to [Academic Integrity information](#) on the TASC website for information about referencing styles, frequently asked questions, and tips and hints for correct referencing.
- A detailed list of works cited must be shown in the Reference List.

Declaration Form

Students must complete and submit the Student Folio Declaration available on the TASC website for teachers before the Folio is submitted. Teachers will hold the declaration and will be asked to provide to TASC if required.

The Folio must be submitted via TRACS. All components of the of the folio will submitted as one complete document.

ADVICE TO TEACHERS

For each of your students you are required to:

- encourage the selection of an Extended Design Project topic that links with an area of genuine interest to them
- approve the Extended Design Project topic
- advise students to rein in the scope of the Extended Design Project rather than encourage the choice of expansive and overly ambitious topics. It is vital that students are advised to produce a fully resolved engineering design project such that each stage of the engineering design process is fully addressed for the context of the project.
- consult with your students regularly during the development of their project
- see all work as it progresses
- make sure the presentation and content requirements for the folio and the penalties for not meeting them are well known
- ensure the students are aware that the project must have rigor in terms of design and design process, including context and purpose.

ADVICE TO MARKERS

The Criteria to be assessed through the marking of the Folio are:

Design Brief

Criterion 1: apply critical and creative thinking to the design of a solution(s) (elements 1, 2)

Criterion 8: analyse the interrelationships between engineering projects and society (elements 1, 2, 3)

Production Proposal

Criterion 1: apply critical and creative thinking to the design of a solution(s) (element 4)

Criterion 2: apply an iterative design cycle to develop engineering design solutions (element 2)

Research Analysis

Criterion 2: apply an iterative design cycle to develop engineering design solutions (element 1)

Criterion 5: use oral and written communication for technical and non-technical audiences (elements 2, 3, 4, 5)

Criterion 8: analyse the interrelationships between engineering projects and society (elements 1, 2, 3)

Design Development

Criterion 1: apply critical and creative thinking to the design of a solution(s) (elements 2, 4)

Criterion 2: apply an iterative design cycle to develop engineering design solutions (elements 1, 2, 3, 4)

Criterion 4: use success criteria to review, reflect and refine the design process and make justified recommendations (elements 1, 3, 4)

Criterion 5: use oral and written communication for technical and non-technical audiences (all elements)

Criterion 8: analyse the interrelationships between engineering projects and society (elements 1, 2, 3)

Design Production

Criterion 2: apply an iterative design cycle to develop engineering design solutions (elements 1, 3, 4)

Criterion 4: use success criteria to review, reflect and refine the design process and make justified recommendations (elements 1, 2, 3)

Criterion 5: use oral and written communication for technical and non-technical audiences (elements 1, 2, 3)

Final Engineered Design

Criterion 4: use success criteria to review, reflect and refine the design process and make justified recommendations (element 4)

Criterion 5: use oral and written communication in for technical and non-technical audiences (elements 1, 2, 3)

Evaluation and Recommendations

Criterion 2: apply an iterative design cycle to develop engineering design solutions (element 1)

Criterion 4: use success criteria to review, reflect and refine the design process and make justified recommendations (elements 2, 3)

Criterion 5: use oral and written communication for technical and non-technical audiences (all elements)

Reference

Criterion 5: use oral and written communication for technical and non-technical audiences (element 4, 5)

Prior to the commencement of marking, markers will be required to meet with the Marking Co-ordinator. This meeting will include training in the use of both the marking guide and the course criterion elements and standards-when determining ratings.

PENALTIES

TASC takes the issue of academic integrity very seriously. If it is found that you breached the external assessment rules, and have not maintained academic integrity when submitting your work for assessment a penalty may be applied.

The following penalties will be applicable through the marking process:

- Folios that exceed the 40-page limit will only have the first 40 pages assessed.

Appendix I – Folio Overview

COMPONENT I	EXPLANATION	CRITERIA ASSESSED	ELEMENTS ASSESSED
Title page	Project title and candidate's TASC ID number. Project team details (TASC ID numbers) if relevant.		
Design Brief	Analysis of engineering design problem and background information connected to the identified need of the project's design intention: <ul style="list-style-type: none"> • statement of problem(s) • description of main aims(s) and objectives(s) • the potential user, target audience or intended client • constraints, and limitations • identification of success criteria. 	1 8	1, 2 1, 2, 3
Production Proposal	The Production Proposal includes: <ul style="list-style-type: none"> • Design specifications • Resource requirements (materials, components, tools, equipment, etc.) • Risk assessment • Budget/costing • Identification of potential collaborations 	1 2	4 2
Research analysis (1500 – 2000 word essay)	This is an integral part of the engineering design process. Research provides a window to essential information about important aspects of the brief, the investigation of materials and components and existing solutions that guide the functional intentions, understanding of professional standards, identify the STEM concepts and processes to inform the design development of the project. This includes: <ul style="list-style-type: none"> • review of previous work/research and relationship to current project • evidence of stakeholder engagement • technological, scientific and mathematical concepts to interpret problems and to inform and support decisions 	2 5 8	1 2, 3, 4, 5 1, 2, 3

	<ul style="list-style-type: none"> • identification of professional standards in relation to ethics in engineering design practice and consumer rights • social, ethical, economic and environmental issues related to technology, materials selected, processes used, and solution design <p>This must demonstrate a direct connection to the project's development and be referenced appropriately.</p>		
Design Development	<ul style="list-style-type: none"> • Articulation of the engineering design process (diagrams, sketches, photographs, annotations) • Ideation • Consideration of alternative solutions and reasons for selection • Production drawings and plans <p>Planning and design ideas are to be analysed to articulate the positive and negative aspects of each when assessed against the design brief and needs.</p>	<p>1</p> <p>2</p> <p>4</p> <p>5</p> <p>8</p>	<p>2, 4</p> <p>1, 2, 3, 4</p> <p>1, 3, 4</p> <p>All elements</p> <p>1, 2, 3</p>
Design Production	<p>The candidate must include photographs/screen grabs and supportive annotations that explain the project production process used to generate the design context. This helps to prove the project is original work.</p> <ul style="list-style-type: none"> • Prototype(s) development and selection <p>The candidate must include testing methods and/or methods for obtaining stakeholder feedback. This may include:</p> <ul style="list-style-type: none"> • Testing methodology/experimental design • Evidence of data collection and data analysis <p>The candidate must describe how prototyping and testing are to be used to articulate the positive and negative aspects of each when assessed against the design brief and needs.</p> <ul style="list-style-type: none"> • Refinement of solution 	<p>2</p> <p>4</p> <p>5</p>	<p>1, 3, 4</p> <p>1, 2, 3</p> <p>1, 2, 3</p>

Final Engineered Design - Resolved engineered solution (product, service, environment)	The candidate must include a suitably resolved engineering design solution that addresses the project's success criteria. <ul style="list-style-type: none"> Annotated photos Video file (voice over or annotation of key features)	4 5	4 1,2, 3
Evaluation and recommendations	Evaluate against project's stated purpose and needs. Reflect on what has been achieved and also what may not have been achieved. Recommendations for further research/testing/improvements/redesign.	2 4 5	1 2, 3 All elements
Reference	Include in-text referencing and a reference list.	5	4, 5