Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

APPENDIX GA36a

LEVEL 4 ASSESSMENT SPECIFICATION

Student name:		**Student ID number:**	
Programme:	**BEng (Hons) Engineering Portfolio**		
Module:	**L4 - Engineering Design**		
Module code:	**M4X01160**	**Contribution to Overall Module Assessment (%):**	**50%**
Lecturer:	**Richard Morgan**	**Internal Verifier:**	**Kerry Tudor**
Assignment Title:	**Engineering Design Project**	**Word count (or equivalent):**	**1600 words in reports + additional design documentation detailed in task breakdown.**
Submission deadline:	**Task 1 14/12/19 (Sat)** **Task 2 03/02/20 (Mon)** **Task 3 20/02/20 (Thurs) *** **Task 4 24/02/20 (Mon)** **Task 5 04/03/20 (Wed) *** **Task 6 11/03/20 (Wed)** *** see table for session times**	**Return date of provisional marks & written feedback:**	**03/05/20**
Submission method:	All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) **Alternative submission method (if applicable):** **Late submission of the assessment will result in a late penalty mark.** Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.		
Academic honesty / referencing:	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.		

Module Learning Outcomes (from module syllabus)	
1	Show a detailed knowledge and understanding of: the design processes and the ability to apply them and evaluate their effectiveness; the impact of and from the environment and legislation factors on the design process and engineering companies.
2	Demonstrate skills in communicating the design, material and manufacturing of products through to the preparation and reading of Engineering Drawings to BS8888 through the medium of 2D and 3D CAD tools (Component B)
3	Demonstrate cognitive skills to allow choice of material and manufacturing processes to meet specific design criteria with relationship to manufacturing volume, mechanical properties, cost, dimensional accuracy and automation. (Components A and B)
4	Demonstrate key transferable skills in problem formulation and decision making, communication and self-management skills as well as working with others (component A)

TASK DESCRIPTION

This piece of coursework requires you to work in a team to develop solutions to an engineering design challenge. The coursework requirements are aligned to an engineering design challenge which is being run for UK based undergraduate, level 4 engineering students. The intention is to run the challenge within UWTSD in the first instance with a view to the winning teams being offered the opportunity to represent the university at regional and national level. The Engineering Design Challenge is being organised by the Institute of Mechanical Engineers and a detailed description of the challenge is available on Moodle.

Note that this coursework specification must be read in conjunction with the Engineering Design Challenge documents which can be accessed on Moodle All team members are required to participate in the project and will be assessed on both their individual contribution and how they are interacting with the group objectives.
Teams will nominally consist of four members. Each member of the team will be assessed against the assessment criteria detailed in this brief. It is important that the assessors are able to attribute work activities to each individual member of the group. It is strongly advised that all groups agree to delegate each group member with a specific area of responsibility. An example of this is detailed in the table below:

Primary Areas of Responsibility	**Secondary Areas of Responsibility** Please note that the lists in this table are only suggestions and examples. They are not an exhaustive list of all the areas which need to be considered in each category.
Team Coordination Mounting System, Systems integration	• Project oversight ensuring that the work carried out in each area is compatible and will meet the specification. • CAD integration of each subsystem. • Integrating frame/chassis design • Managing trade-offs and breaking down system specifications into subsystem specifications. E,g, how much force is required? What are the repeatability thresholds? What are the 'global' system requirements?
Power Generation and Storage System	• Energy system o type/configuration o weight / size o cost / availability o mounting / compatibility o service life o reliability
Energy Release (Trigger) and Safety System	• Trigger / Release o Mechanism options o Life in service o reliability

	o electro-mechanical interface. o Forces/loads and the effects of vibration o Material selection for mechanism elements • Safety System (to avoid miss-fire) o Methods o Reliability o Fail-safe – (auto-auto)
Lateral Aiming and Range Adjustment System	• System Concepts • Lateral adjustment increments • Range adjustment increments • Predictive settings • Rigidity and stiffness
Projectile Launch and Line Management	• Barrel / channel geometry o Muzzle features o Material selection o Life-in-Service requirements. • Line Management System o Entanglement Avoidance o Drag/Loss reduction o Rewinding/resetting/reloading

This coursework has five discrete tasks with separate requirements and deadlines. Details of each of the tasks, is outlined in the table below:

Task	**Assessment Deliverable**	**Assessment Format**	**Assessment Deadline**
1	Research Report and Engineering/Product Design Specification	• Compiled Group – Written Research Report • (max of 600 words per person) detailing the research work undertaken by each team member. • An Engineering/Product Design Specification. The report should clearly detail each member of the group's, areas of responsibility.	14/12/19 (Sat) (Turnitin submission)
2	Presentation of concept designs and final design proposal. Technical Drawing from each team member is required as a separate/individual submission to the report.	• Compiled Group – Written Report (max of 1000 words per person) • Supporting material to be included in report e.g. design calculations / technical drawings / solid models / diagrams etc.	03/02/20 (Mon)
3	Engineering Design Demonstration (1st Run)	Physical demonstration of projectile launcher (competition heats as specified in the Design Challenge documentation)	20/02/20 (Thurs) 9:00am-11:00am in Computer Aided Manufacturing Lab
4	Technical Poster	Poster Submission. • The poster should be A1 size in portrait format. It should clearly display the Group's identity/name, the UWTSD logo and that of the IMechE. • The poster should concisely describe the device, how it operates and the engineering principles it's based on. It should include, but is not limited to: o Sketch, 3D visualisation or 2D technical drawings representing the device. o Text to explain important features shown in the drawings. o Details of how and why the device works, using diagrams if necessary. o Brief details of the team members.	24/02/20 (Mon) (Turnitin submission)
5	Engineering Design Demonstration Challenge (2nd Run) & Group Presentation	• Physical demonstration of the projectile launcher (competition heats as specified in the Design Challenge documentation) • Group Presentation: Duration – five minutes with two minutes for questions. Each member of the group should present their own area of responsibility. The presentation should include, but is not limited to: o The principle features of the final design o The engineering science that underpins the device	04/03/20 (Wed) Presentations – 9:00am-11:30am Competition 12:00am-14:00pm in the Computer Aided Manufacturing Lab

		o The steps the team followed to arrive at the design o The cost of the final design and if/how costs influenced the final design. o Reflections on individual and group's performance and challenges.	
6	Engineering Design Project Reflection	• Compile a report which reflects on the following: o The group working dynamic o Time management o The device design and performance o What lessons you've learned which could benefit you in future individual/group design challenges.	11/03/20 (Wed)

GUIDANCE FOR STUDENTS IN THE COMPLETION OF TASKS

NOTE: The guidance offered below is linked to the five generic assessment criteria overleaf.

1. Engagement with Literature Skills

This area will be evaluated through your research report submission.

Your work must be informed and supported by scholarly material that is *relevant* to and *focused* on the task(s) set. You should provide evidence that you have accessed an appropriate *range* of sources, which may be academic, governmental and industrial; these sources may include academic journal articles, textbooks, current news articles, organisational documents, and websites. You should consider the *credibility* of your sources; academic journals are normally highly credible sources while websites require careful consideration/selection and should be used sparingly. Any sources you use should be current and up-to-date, mostly published within the last five years or so, though seminal/important works in the field may be older. You must provide *evidence* of your research/own reading throughout your work, using a suitable referencing system, including in-text citations in the main body of your work and a reference list at the end of your work.

2. Knowledge and Understanding Skills

This area will be evaluated through the presentation of your concept designs and final design proposal in your second report submission.

At level 4, you should be able to demonstrate knowledge of the underlying concepts and principles associated with your area(s) of study. *Knowledge* relates to the facts, information and skills you have acquired through your learning. You demonstrate your *understanding* by interpreting the meaning of the facts and information (knowledge). This means that you need to select and include in your work the concepts, techniques, models, theories, etc. appropriate to the task(s) set. You should be able to explain the theories, concepts, etc. to show your understanding. Your mark/grade will also depend upon the *extent* to which you demonstrate your knowledge and understanding.

3. Cognitive and Intellectual Skills (defence and evaluation of designs)

The marks for this section will be awarded based upon the presentation which you will give to tutors on the day of the final practical demonstration/competition.

You should be able to present, evaluate and interpret qualitative and quantitative data, in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of your subject(s) of study. You should be able to evaluate the appropriateness of different approaches to solving problems related to your area(s) of study and/or work. Your work must contain evidence of logical, analytical thinking. For example, to examine and break information down into parts, make inferences, compile, compare and contrast information. This means not just describing what! But also justifying: Why? How? When? Who? Where? At what cost? You should provide justification for your arguments and judgements using evidence that you have reflected upon the ideas of others within the subject area and that you are able to make sound judgements and arguments using data and concepts. Where relevant, alternative solutions and recommendations may be proposed.

4. Practical Skills

The marks for this area will be awarded through the Engineering Design Challenge Demonstration / Competition. There will be two separate competition runs. You will be evaluated on your device's ability to perform in the competitions. 50% of the marks for 'Practical Skills' will be awarded at the first event and the other 50% will be awarded at the second event.

At level 4, you should be able to apply the basic underlying concepts and principles to evaluate and interpret these within the context of your area of study. You should be able to demonstrate how the subject-related concepts and ideas relate to real world situations and/or a particular context. How do they work in practice? You will deploy models, methods, techniques, and/or theories, in that context, to assess current situations, perhaps to formulate plans or solutions to solve problems, or to create artefacts. This is likely to involve, for instance, the use of real world artefacts, examples and cases, the application of a model within an organisation and/or benchmarking one theory or organisation against others based on stated criteria.

5. Transferable Skills for Life and Professional Practice (presentation and poster)
The marks for this area will be awarded based upon the content of the technical poster.

Your work must provide evidence of the qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility. This includes demonstrating: that you can communicate the results of your study/work accurately and reliably, and with structured and coherent arguments; that you can initiate and complete tasks and procedures, whether individually and/or collaboratively; fluency of expression; clarity and effectiveness in presentation and organisation. Work should be coherent and well-structured in presentation and organisation.

STUDENT FEEDBACK FORM

This section details the *extent* to which the assessment criteria are demonstrated by you, which in turn determines your mark. The marks available for each category of skill are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.

Generic Assessment Criteria	**Marks available**	**Marks awarded**
1. Engagement with Literature Skills		
This area will be evaluated through your research report submission.	10	
2. Knowledge and Understanding Skills		
This area will be evaluated through the presentation of your concept designs and final design proposal in your second report submission.	25	
3. Cognitive and Intellectual Skills		
The marks for this section will be awarded based upon the presentation which you will give to tutors on the day of the final practical demonstration/competition.	25	
4. Practical Application Skills		
The marks for this area will be awarded through the Engineering Design Challenge Demonstration / Competition. There will be two separate runs. You will be evaluated on your device's ability to perform in the demonstration and competitions. 50% of the marks (15 marks) for 'Practical Skills' will be awarded at the first event (demonstration) and the other 50% (15 marks) will be awarded at the second event.	30	
5. Transferable Skills for Life and Professional Practice		
The marks for this area will be awarded based upon the content of the technical poster.	10	

Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)	**Late Submission Penalties (tick if appropriate)**		**%**
	Up to 1 week late (40% Max)		
	Over 1 week late (0%)		

GENERIC ASSESSMENT CRITERIA

Level 4
In accordance with the Framework for Higher Education Qualifications, at the end of Level 4 students will be expected to have demonstrated knowledge of the basic underlying concepts and principles of a subject, and an ability to evaluate and interpret these within the context of that area of study. They should be able to present, evaluate and interpret qualitative and quantitative data in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of their subject(s) of study. They will have learned how to evaluate different approaches to solving problems, and will be able to communicate the results of their study/work accurately and reliably, and with structured and coherent arguments. They will be able to undertake further training and develop new skills within a structured and managed environment and will have the qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility.

Level 4	FAIL	MARGINAL FAIL	SATISFACTORY (3rd / Pass)	GOOD (2.2 / Pass)	VERY GOOD (2.1 / Merit)	EXCELLENT (1st / Distinction)	EXCEPTIONAL (1st / Distinction)
Category	**0-29%**	**30-39%**	**40-49%**	**50-59%**	**60-69%**	**70-84%**	**85-100%**
Engagement with literature (including reading, referencing, academic conventions and academic honesty)	Little or no evidence of reading and/or reliance on inappropriate sources. Views and findings mostly unsupported and non-authoritative. Referencing conventions used incoherently or largely absent.	Poor engagement with essential reading. No evidence of wider reading. Reliance on inappropriate sources, and/or indiscriminate use of sources. Heavily reliant on information gained through class contact. Inconsistent and weak use of referencing.	Engagement with a limited range of mostly relevant and credible sources but with some reliance on information gained through class contact. Some omissions and minor errors. Referencing conventions evident though not always applied accurately or consistently.	Engagement with an appropriate range of literature, including sources retrieved independently. Some over-reliance on texts rather than other sources. Referencing may show minor inaccuracies or inconsistencies.	Engagement with a wide range of literature, including sources retrieved independently. Selection of relevant and credible sources. Generally sound referencing, with no/very few inaccuracies or inconsistencies.	Engagement with an extensive range of relevant and credible literature. Consistently accurate application of referencing.	Exceptional engagement with an extensive range of relevant and credible literature. High-level referencing skills consistently applied.
Knowledge and understanding (Knowledge of the basic underlying concepts and	Major gaps in knowledge and understanding of the basic underlying concepts and	Gaps in knowledge of the basic underlying concepts and principles, with flawed or	Limited knowledge and understanding of the basic underlying concepts and	Knowledge of the basic underlying concepts and principles is accurate with a	Competent knowledge of the basic underlying concepts and principles. Exhibits very	Excellent knowledge and understanding of the basic underlying concepts and	Exceptional, detailed knowledge and understanding of the basic underlying

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Category	**0-29%**	**30-39%**	**40-49%**	**50-59%**	**60-69%**	**70-84%**	**85-100%**
principles of a subject.)	principles of the subject matter. Inclusion of irrelevant material. Substantial inaccuracies.	superficial understanding. Some significant inaccuracies and/or irrelevant material.	principles within the subject area. Some elements may be missing.	good understanding of the field of study but lacks depth and/or breadth.	good understanding.	principles of the subject.	concepts and principles
Cognitive and intellectual skills (Evaluate underlying concepts and principles of a subject and interpret qualitative and quantitative data in order to develop lines of argument and make sound judgements.)	Wholly or almost wholly descriptive work. Little or no evaluation of the underlying concepts and principles. Failure to develop arguments, leading to illogical or invalid judgements. Minimal or no use of evidence to back up views.	Largely descriptive work, with superficial evaluation of the underlying concepts and principles. Weak interpretation of data, flawed development of arguments and judgements. Information accepted uncritically, uses generalised statements made with scant evidence and unsubstantiated opinions. Ideas sometimes illogical and contradictory.	Limited attempt at evaluation of the underlying concepts and principles, tending towards description. Can interpret qualitative and quantitative data but with some errors. Some evidence to support emerging arguments and judgements but these may be underdeveloped or with a little inconsistency / mis-interpretation.	Good evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data, with minor errors. An emerging ability to use evidence to support the argument. Mostly valid arguments and logical judgements.	Sound evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data accurately. Ability to devise arguments using evidence to make mostly appropriate and valid judgements.	Excellent evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data accurately and with some insight. Excellent ability to devise arguments using evidence and make appropriate and valid judgements.	Exceptional evaluation of the underlying concepts and principles based evidence. Outstanding interpretation of qualitative and quantitative data. Exceptional ability to devise arguments using evidence and make wholly appropriate and valid judgements.
Practical skills (Different approaches to solving problems in particular contexts.)	Limited or no use of taught, basic methods, materials, tools and/or techniques. Little or no appreciation of the context of the application.	Rudimentary application of taught, basic methods, materials, tools and/or techniques but without consideration and	An adequate awareness and mostly appropriate application of basic methods, materials, tools and/or techniques.	A good and appropriate application of basic methods, materials, tools and/or techniques. Clear appreciation of	A very good application of a range of basic methods, materials, tools and/or techniques. Very good consideration of the context of	An advanced application of a range of taught, basic methods, materials, tools and/or techniques. The context of the application is	Exceptional levels of application and deployment skills in particular practical contexts. Outstanding identification of

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Category	**0-29%**	**30-39%**	**40-49%**	**50-59%**	**60-69%**	**70-84%**	**85-100%**
	Very weak evidence of different approaches to problem-solving in particular contexts.	competence. Flawed appreciation of the context of the application. Weak evidence of different approaches to problem-solving in particular contexts.	Basic appreciation of the context of the application. Can identify problems in particular contexts and propose basic alternative approaches or solutions though there may be errors.	the context of the application. Good evidence of different approaches to problem-solving in particular contexts and proposes mostly appropriate solutions.	the application. Very good evidence of different approaches to problem-solving in particular contexts and proposes appropriate solutions.	well considered, and insightful. Excellent evidence of different approaches to problem-solving in particular contexts and proposes appropriate solutions.	problems in particular contexts and formulation of wholly appropriate, thoughtful solutions / different approaches.
Transferable skills for life and professional practice (Communicate the results of their study/work accurately and reliably, and with structured and coherent arguments; the qualities needed for employment requiring the exercise of some personal responsibility within a structured and managed environment.)	Work is poorly structured, disorganised, inaccurate and/or confusingly expressed. Very weak use of language and/or very inappropriate style. Failure to work effectively individual or as part of a group. Little or no evidence of the skills for employment requiring the exercise of some personal responsibility.	Work is poorly presented in a disjointed manner. It is loosely, and at times incoherently, structured, with information and ideas often poorly expressed. Weak use of language and/or inappropriate style. Flawed approach to individual or group work, meeting only partial obligations to others. Limited evidence of the skills for employment requiring the	Mostly ordered presentation and structure in which relevant ideas / concepts are reasonably expressed. Work may lack coherence and/or accuracy in places. Can work as part of a group, meeting most obligations to others but perhaps with limited involvement in group activities. Demonstrates the basic skills for employment requiring the exercise of some personal responsibility, with some areas	Mostly coherent, organised and accurate work, in a suitable structure and is for the most part clearly expressed. Can work effectively independently and/or as part of a team, with clear contribution to group activities. Demonstrates the skills for employment requiring the exercise of some personal responsibility, with some areas of strength and some of minor weakness.	Work is accurate, coherent, fluent, well-structured and organised. Can work effectively independently and/or as part of a team, with very good contribution to group activities. Demonstrates very good skills for employment requiring the exercise of some personal responsibility, with just occasional minor weakness.	Work is coherent, very fluent and is presented professionally. Can work effectively independently and/or as part of a team, with an excellent contribution to group activities. Demonstrates excellent skills for employment requiring the exercise of some personal responsibility with an appetite for further development.	Work is accurate, exceptionally coherent, very fluent and presented well. Can work effectively independently and/or as part of a team, with an exceptional contribution to group activities. Demonstrates exceptional skills for employment requiring the exercise of some personal responsibility with an appetite for further development.

Level 4	FAIL	MARGINAL FAIL	SATISFACTORY (3rd / Pass)	GOOD (2.2 / Pass)	VERY GOOD (2.1 / Merit)	EXCELLENT (1st / Distinction)	EXCEPTIONAL (1st / Distinction)
Category	**0-29%**	**30-39%**	**40-49%**	**50-59%**	**60-69%**	**70-84%**	**85-100%**
		exercise of some personal responsibility.	of minor weakness.				

THIS DOCUMENT IS ALSO AVAILABLE IN WELSH