

ENGINEERING 9 MYP DESIGN Year 5



Course Overview:

This is a semester course that meets both provincial learning outcomes and IB MYP Technology aims and objectives. This course encourages students to develop design skills and technical skills through an applied science and engineering perspective. Students will use the design cycle to investigate an engineering problem, plan a solution to the problem, create and use an evaluation of the students' design. To overcome these engineering challenges, students will work collaboratively to overcome their assigned task. This course will also give students the opportunity to learn a variety of technical skills such as drafting and design, fabrication using various material and technical processes to create a multitude of various projects. Through direct instruction, student based inquiry and hands on project based learning, students will engage in solving various technical solutions to technical challenges.

Classroom Rules and Expectations:

- No horseplay – zero tolerance here in the shop.
- No Foul language – we have all heard it before but we want our class community to be respectful and represent ourselves with respect at all times.
- No food or drink without permission – please clean up after yourself, if this is abused, I will need to take away this privilege.
- It is expected that students will maintain a decent level of respect and courtesy towards staff and students.
- Students have the right to study in an environment that is free from racism, sexism, homophobia or any other form of harassment.
- It is expected that you will arrive on time for class. If you are late, please wait by the door until instructed to be seated.
- It is expected that students will not forfeit their right to success in this class by skipping classes.
- It is always expected that you will give your personal best.
- It is expected that you will maintain your integrity in class.
- It is expected that you will always try your hardest to maintain your personal honour while participating in this class.
- Participation in a regular cleanup is expected for this class.

In return you should expect from your teacher the following:

1. That he will always try to remain patient and understanding
2. That he will always try to show respect and courtesy
3. That he will always try to answer your questions and help you succeed in this class
4. That he will try to remain flexible as possible
5. That he will maintain an environment that is safe and caring

Learning:

Through engaging with this course, students should UNDERSTAND...

Design is a collaborative endeavour which relies on a positive and healthy working environment.



Engineers apply their knowledge of math, Science and the humanities to overcome technical challenges.



Critical thought is essential to overcome technical challenges.



Through engaging with this course, students will KNOW...

Statement of Inquiry	Concepts	Unit Title/Topic
Engineers develop new technology by overcoming challenges through prototyping electronic circuits and adapting existing electronic circuitry.	Development is the act or process of growth, progress or evolution, sometimes through iterative improvements.	IB Systems and Innovation Unit

Through engaging with this course, students will DO...

CURRICULAR COMPETENCIES CATEGORIES	EXAMPLES
Design	Students will learn basic design principles including drafting, and Computer Aided Design including use of Sketchup and Isometric design principles.
Knowledge integration	Integrate math, science and humanities to solve engineering related problems.
Coding	Students will learn basic code to use with microcontrollers.
Prototyping	Student will learn various prototyping techniques to aid in the iterative process.
Fabrication	Students will build electronic circuits capable of solving an everyday problem.
Circuit Testing	Students will learn how to troubleshoot various circuits and use problem solving tools to overcome various challenges the young engineer may face with their projects.

Through this course, students will develop the following Approaches to Learning skills...

Below are some examples of how we develop ATL skills in this course:

Category Skill indicator	Examples
Thinking skills	Encourage unique and original thought through using a multitude of different perspectives and problem solving to overcome course design challenges.
Social skills	Working together to create a classroom community based on care for each other and acceptance of others.
Communication skills	Communicate through a variety of different design medium including web based and material.
Self-management skills	Develop positive ways to handle stress and challenging situations while in this class and outside of the class.
Research skills	Make connections between scientific research and related moral, ethical, social, economic, political, cultural or environmental factors.

Assessment:

Throughout this course, students will demonstrate their learning...

This course will focus on developing skills related to the following areas.	Formative assessment is assessment <i>as</i> learning, or assessment <i>for</i> learning. Formative assessments could include;	Summative assessment is assessment <i>of</i> learning. Summative assessments could include;
Inquiry and Analysis	Tests, quizzes, games, role plays, presentations.	Design Brief, Presentation
Developing Ideas	Final drawings, renderings, work flow, Sketchup, flow charts	Design brief
Creation	Sketches, prototypes, model	Design Brief/Final product
Reflection	Discussion, presentation, interviews	Reflection in Design Brief

Equipment needed for this course:

- Laptop (optional)
- Pen/ mechanical pencil

Academic Honesty and Personal Integrity

The faculty at Carson Graham expects our students to complete academic and nonacademic work that is authentic and respectful of intellectual property. All students are expected to adhere to the school's Policy for Academic Integrity. Ignorance of the standards related to academic honesty and student integrity is not an excuse for dishonesty, plagiarism and malpractice. You are expected to familiarize yourself with the policy.

<https://www.sd44.ca/school/carson/About/schoolpolicies/Documents/Carson%20Graham%20Academic%20Honesty%20Policy%20reviewed%20December%202018.pdf>

Grade Descriptors:

Grade 7

Produces high-quality, frequently innovative design solutions through the application of the design cycle. Communicates comprehensive, nuanced understanding of design concepts and contexts through independent and detailed work. Consistently demonstrates sophisticated critical and creative thinking to inform research methods and to refine selected solutions. Frequently transfers knowledge and applies skills, with independence and expertise, to complex real-world issues.

Grade 6

Produces high-quality, occasionally innovative design solutions through the application of the design cycle. Communicates extensive understanding of design concepts and contexts through independent and detailed work. Demonstrates critical and creative thinking to inform research methods and to refine selected solutions, frequently with sophistication. Transfers knowledge and applies skills, often with independence, to real-world issues.

Grade 5

Produces generally high-quality design solutions through the application of the design cycle. Communicates good understanding of design concepts and contexts. Demonstrates critical and creative thinking to inform research methods and to refine selected solutions, sometimes with sophistication. Usually transfers knowledge and applies skills, with some independence, to real-world issues.

Grade 4

Produces good-quality design solutions through the application of the design cycle. Communicates basic understanding of design concepts and contexts, with few misunderstandings and minor gaps. Often demonstrates critical and creative thinking to inform research methods and to refine selected solutions. Transfers some knowledge and applies some skills in familiar situations, but requires support in unfamiliar situations.

Grade 3

Produces design solutions of an acceptable quality that generally follow the design cycle. Communicates basic understanding of design concepts and contexts in the work with occasional significant misunderstandings or gaps. Begins to demonstrate some critical and creative thinking to inform research methods and to refine selected solutions. Begins to transfer knowledge and apply skills, requiring support even in familiar situations.

Grade 2

Produces work of limited quality. Communicates limited understanding of some design concepts and contexts. Demonstrates limited evidence of critical or creative thinking. Limited evidence of transfer of knowledge or application of skills.

Grade 1

Produces work of a very limited quality. Conveys many significant misunderstandings or lacks understanding of most design concepts and contexts. Very rarely demonstrates critical or creative thinking. Very inflexible, rarely shows evidence of knowledge or skills.

Grade 10

Criterion A: Inquiring and analysing

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below.
1-2	The student: <ul style="list-style-type: none"> • states the need for a solution to a problem for a specified client/target audience • develops a basic design brief, which states the findings of relevant research.
3-4	<ul style="list-style-type: none"> • outlines the need for a solution to a problem for a specified client/target audience • outlines a research plan, which identifies primary and secondary research needed to develop a solution to the problem, with some guidance • analyses one existing product that inspires a solution to the problem • develops a design brief, which outlines the analysis of relevant research.
5-6	<ul style="list-style-type: none"> • explains the need for a solution to a problem for a specified client/target audience • constructs a research plan, which identifies and prioritizes primary and secondary research needed to develop a solution to the problem, with some guidance • analyses a range of existing products that inspire a solution to the problem • develops a design brief, which explains the analysis of relevant research.
7-8	<ul style="list-style-type: none"> • explains and justifies the need for a solution to a problem for a client/ target audience • constructs a detailed research plan, which identifies and prioritizes the primary and secondary research needed to develop a solution to the problem independently • analyses a range of existing products that inspire a solution to the problem in detail • develops a detailed design brief, which summarizes the analysis of relevant research.

Criterion B: Developing ideas

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below.
1-2	The student: <ul style="list-style-type: none"> • lists some basic design specifications for the design of a solution • presents one design, which can be interpreted by others • creates incomplete planning drawings/diagrams.
3-4	<ul style="list-style-type: none"> • lists some design specifications, which relate to the success criteria for the design of a solution • presents a few feasible designs, using an appropriate medium(s) or annotation, which can be interpreted by others • justifies the selection of the chosen design with reference to the design specification • creates planning drawings/diagrams or lists requirements for the creation of the chosen solution.
5-6	<ul style="list-style-type: none"> • develops design specifications, which outline the success criteria for the design of a solution • develops a range of feasible design ideas, using an appropriate medium(s) and annotation, which can be interpreted by others • presents the chosen design and justifies its selection with reference to the design specification • develops accurate planning drawings/diagrams and lists requirements for the creation of the chosen solution.
7-8	<ul style="list-style-type: none"> • develops detailed design specifications, which explain the success criteria for the design of a solution based on the analysis of the research • develops a range of feasible design ideas, using an appropriate medium(s) and detailed annotation, which can be correctly interpreted by others • presents the chosen design and justifies fully and critically its selection with detailed reference to the design specification • develops accurate and detailed planning drawings/diagrams and outlines requirements for the creation of the chosen solution.

Criterion C: Creating the solution

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below.
1-2	The student: <ul style="list-style-type: none"> • demonstrates minimal technical skills when making the solution • Creates the solution, which functions poorly and is presented in an incomplete form.
3-4	The student: <ul style="list-style-type: none"> • constructs a plan that contains some production details, resulting in peers having difficulty following the plan • demonstrates satisfactory technical skills when making the solution • creates the solution, which partially functions and is adequately presented • outlines changes made to the chosen design and plan when making the solution.
5-6	The student: <ul style="list-style-type: none"> • constructs a logical plan, which considers time and resources, sufficient for peers to be able to follow to create the solution • demonstrates competent technical skills when making the solution • creates the solution, which functions as intended and is presented appropriately • describes changes made to the chosen design and plan when making the solution.
7-8	The student: <ul style="list-style-type: none"> • constructs a detailed and logical plan, which describes the efficient use of time and resources, sufficient for peers to be able to follow to create the solution • demonstrates excellent technical skills when making the solution. • follows the plan to create the solution, which functions as intended and is presented appropriately • fully justifies changes made to the chosen design and plan when making the solution.

Criterion D: Evaluating

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below.
1-2	The student: <ul style="list-style-type: none"> • designs a testing method, which is used to measure the success of the solution • states the success of the solution.
3-4	The student: <ul style="list-style-type: none"> • designs a relevant testing method, which generates data, to measure the success of the solution • outlines the success of the solution against the design specification based on relevant product testing • outlines how the solution could be improved • outlines the impact of the solution on the client/target audience.
5-6	The student: <ul style="list-style-type: none"> • designs relevant testing methods, which generate data, to measure the success of the solution • explains the success of the solution against the design specification based on relevant product testing • describes how the solution could be improved • explains the impact of the solution on the client/target audience, with guidance.
7-8	The student: <ul style="list-style-type: none"> • designs detailed and relevant testing methods, which generate data, to measure the success of the solution • critically evaluates the success of the solution against the design specification based on authentic product testing • explains how the solution could be improved • explains the impact of the product on the client/target audience.