Dr. G.W Williams Course Outline
Technological Education Department:
Grade 11 Technological Design

Course Type:	Open	Course Code: TDJ3M
Credit Value:	1.0	

Ministry Guideline:

The Ontario Curriculum, Grades 11 & 12, 2009

Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools, 2010

Think Literacy: Cross Curricular Approaches, Grades 7-12, 2003

YRDSB Guideline:

Curriculum Framework Series: Guidelines for Curriculum Implementation, 2007

Curriculum Framework Series: Guidelines for Literacy, 2007

Curriculum Framework Series: Guidelines for Assessment and Evaluation for York Region Schools, 2006

Curriculum Framework Series: Guidelines for Instruction, 2004

Curriculum Framework Series: Information Communications Technology and the Learner, 2003

Curriculum Expectations for York Region Schools: A Curriculum Framework, 2001

Major Resources:

Google
Moodle
Adobe

Department Head: P. Manson

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DESCRIPTION

This course is designed to develop the technological and computer concepts students will need to design, develop and build usable products and graphic presentations. Students will use the design process, be introduced to a variety of software programs and learn problem-solving and communication techniques.

COURSE CURRICULUM STRANDS

- Technological Design Fundamentals
- Technological Design Skills
- Technology, the Environment, and Society
- Professional Practice and Career Opportunities

CURRICULUM EXPECTATIONS

Technological Design Fundamentals

1. Demonstrate an understanding of factors and relationships that affect technological design and the design process;

2. Describe appropriate strategies, techniques, and tools for researching, organizing, planning, and managing design projects and related activities, with an emphasis on financial, human, and material resources;

3. Demonstrate an understanding of drafting standards, conventions, and guidelines for various types of drawings used to represent designs;.

4. Demonstrate an understanding of a variety of tools, materials, equipment, and processes used to build, test, and evaluate models and prototypes

4. Use appropriate terminology and communication methods to document, report, and present progress and results

Technological Design Skills

1. Use appropriate strategies and tools to research and manage design projects and related activities;

2. Apply appropriate methods for generating and graphically representing design ideas and solutions;

3. Create and test models and/or prototypes, using a variety of techniques, tools, and materials

4. Use a variety of formats and tools to create and present reports summarizing the design process and to reflect on decisions made during the process.

Technology, the Environment, and Society

1. Demonstrate an understanding of environmentally responsible design practices, and apply them in the technological design process and related activities;;

2. Describe the relationship between society and technological development

Professional Practice and Career Opportunities

1. Describe and apply health, safety, and environmental practices related to technological design;

2. Identify career opportunities in fields related to technological design, and describe the training and education required for these careers.

INSTRUCTIONAL APPROACHES

This course is based on the following four key beliefs:

- *all students can achieve high standards given the right time and support;*
- *all teachers can teach to high standards given the right assistance;*
- *high expectations and early interventions are essential;*
- *teachers need to be able to articulate what they do and why they teach the way that they do.*

Teachers who provide quality instruction respect students' strengths and address their learning needs, using assessment information to plan instruction. They clarify the purpose for learning, help students activate prior knowledge, and differentiate instruction for individual students and small groups according to need.

Teachers explicitly teach and model learning strategies and encourage students to talk through their thinking and learning processes. They also provide many opportunities for students to practise and apply their developing knowledge and skills, involving students in the learning process.

Effective teaching approaches involve students in the use of higher-level thinking skills and encourage them to look beyond the literal meaning of texts and to think about fairness, equity, social justice, and citizenship in a global society.

Motivating students and instilling positive habits of mind, such as a willingness and determination to persist, to think and communicate with clarity and precision, to take responsible risks, and to question and pose problems, are also integral to high-quality instruction. This will include the development of leaning skills.

INSTRUCTIONAL STRATEGIES

Using a variety of instructional, assessment, and evaluation strategies, teachers provide numerous hands-on opportunities for students to develop and refine their problem- solving skills, critical and creative thinking skills, and communication skills, while discovering fundamental concepts through activities and projects, exploration, and research. The activities offered should enable students to relate and apply these concepts to the social, environmental, and economic conditions and concerns of the world in which they live. Opportunities to relate knowledge and skills to these wider contexts will motivate students to learn in a meaningful way and to become lifelong learners.

ASSESSMENT& EVALUATION STRATEGIES

The primary purpose of assessment and evaluation is to improve student learning. Information gathered through assessment helps teachers to determine students' strengths and weaknesses in their achievement of the curriculum expectations in each course. Teachers will use conversations, products, and observations to gather evidence to determine student achievement. As part of assessment, teachers provide students with descriptive feedback that guides their efforts towards improvement. Evaluation refers to the process of judging the quality of student work on the basis of established criteria, and assigning a value to represent that quality.

Throughout this course, the following assessment for learning, assessment as learning, and assessment of learning strategies will be used such as:

- *diagnostic assessments to determine what students already know so that teachers can plan instruction and assessment that is differentiated and appropriate so that students and teachers can develop learning goals and success criteria;*
- *eliciting information about student learning through personal assessments that include: level of understanding, learning styles, interests and needs of students;*
- *descriptive feedback where students can improve in a timely manner;*
- *formative assessments in an ongoing manner during instruction to monitor students' progress towards achieving overall expectation as well as; guide next steps, share examples of student work, check for understanding, and help students*

monitor their progress towards achieving their learning goals;
- *through targeted instruction, teachers will engage students as learning resources for one another and to help students understand what it means to own their own learning and empowering them by developing student self-assessment and peer assessment skills; and in setting individual goals;*
- *summative assessments will be given near the* end of the unit and is used by the teacher to *summarize learning at a given point of time.*

Students will be given a number of opportunities to demonstrate the full extent of their achievement of the curriculum expectations across all four categories of the Achievement Chart. Teachers will triangulate data by Using conversations, observations, and products as evidence of student learning.

Throughout this course, evidence of student achievement for evaluation will be collected through the use of:

- *ongoing technological-based assignments;*
- *performance problems;*
- *interviews and conferences;*
- *observation and dialogue;*
- *culminating project; and a*
- *cross curricular task.*

LITERACY AND CRITICAL THINKING STRATEGIES

Literacy involves the development of a continuum of skills, knowledge and attitudes that prepare all of our learners for life in a changing world community. It begins with the fundamental acquisition of skills in reading, writing, listening, and speaking through communications. It becomes the ability to understand, think, apply and communicate effectively in all subject and program areas in a variety of ways for a variety of purposes. Teachers will promote the following literacy strategies:

- *creating a word wall – provide visual clues and cues for the students when learning or reviewing communications technology vocabulary for a unit of study;*
- *concept circles – create a visual connection between concepts and vocabulary;*
- *developing and organizing Ideas – to identify relationships and make connections among ideas and information (e.g. producing a pre-production package (treatment, script, storyboard, shot list) to guide production process);*
- *writing for a purpose – distinguish main ideas and supporting details for a paragraph and provide specific and supportive detail in the writing;*
- *oral communication – encourage students to think about a question and then refine their understanding through discussion with a partner, small group, or four corners;*
- *model proper use of symbols, vocabulary, and notations in oral and written form and expect students to correctly use them in their work;*
- *ensure that students are exposed to and use new communications technology terminology as it is introduced;*
- *ask clarifying and extending questions and encourage students to ask themselves similar kinds of questions; and*
- *ask students open-ended questions to encourage inquiry based learning on related topics.*

EDUCATIONAL PRINCIPLES

TWENTY FIRST CENTURY LEARNING

The goal of Ontario secondary schools is to support high-quality learning while giving individual students the opportunity to choose programs that suit their skills and interests. The updated Ontario curriculum, in combination with a broader range of learning options outside traditional classroom instruction, will enable students to better customize their high school education and improve their prospects for success in school and in life.

PLANNING FOR STUDENTS WITH SPECIAL EDUCATION NEEDS

Classroom teachers are the key educators of students who have special education needs. They have a responsibility to help all students learn, and work collaboratively with the parents, the Special Education team, and Student Success to achieve this goal. Throughout the course, teachers:

- *will implement suggestions and accommodations on IEP with regards to instruction and assessment & evaluation;*
- *will support students with IEP's by having ongoing communication with students, parents, SERT, and the Student Success teacher; and*
- *will use assessment and evaluation strategies to specify and verify student's needs and determine in consultation with the in-school team whether or not the student requires accommodations or modifications.*

A set of beliefs that should guide program planning for students with special education needs *in all disciplines* are as follows:

- *All students can succeed;*
- *Teachers will implement suggestions and accommodations on IEP with regards to instruction and assessment & evaluation*
- *Teachers will support students with IEP's by having ongoing communication with students, parents, SERT, and the Student Success teacher;*
- *Differentiated instruction is effective for any group of students;*
- *Successful instructional practices are founded on evidence-based research,tempered by experience;*
- *Classroom teachers are key educators for a student's literacy and numeracy development;*
- *Each student has his or her own unique patterns of learning;*
- *Classroom teachers need the support of the larger community to create a learning environment that supports students with special education needs;*
- *Fairness is not sameness.*

PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS

Teachers of technological education must incorporate appropriate adaptations and strategies for instruction and assessment to facilitate the success of the English language learners in their classrooms.

FINANCIAL LITERACY

Financial literacy may be defined as "having the knowledge and skills needed to make responsible economic and financial decisions with competence and confidence". Making financial decisions has become an increasingly complex task in the modern world. Consequently, people need to have knowledge in various areas and a wide range of skills in order to make informed decisions about financial matters. They need to be aware of risks that accompany various financial choices. They also need not only to develop an understanding of world economic forces, but also to become aware of ways in which they themselves can respond to those influences and make informed choices. In this course, students will develop skills in problem solving, inquiry, decision making and critical thinking that will enable them to understand and respond to complex issues regarding their own personal finances and to develop an understanding of the local and global effects of world economic forces and the social, environmental, and ethical implications of their own choices as consumers.

EQUITY AND INCLUSIVE EDUCATION

All teachers will promote positive and respectful relations with and between members of all school communities. We have a responsibility to ensure that their students have an equal opportunity to achieve their full potential, regardless of race, ethnicity, culture, faith, language and nationality. The curriculum will be free from bias, and all students will be provided with a safe and secure environment, characterized by respect for others, that allows them to participate fully and responsibly in the educational experience.

LITERACY, MATHEMATICAL LITERACY, AND INQUIRY/RESEARCH SKILLS

Literacy skills can play an important role in student success in technological education courses. Many of the activities and tasks students undertake in technological education courses involve the use of written, oral, and visual communication skills. Teachers should encourage conceptual understanding of technological concepts and apply them to solve real-life applications. Teachers are encouraged to use inquiry-based learning to further consolidate student understanding of real life technological concepts.

THE ROLE OF THE SCHOOL LIBRARY

The school library program can help to build and transform students' knowledge to support lifelong learning in our information and knowledge-based society. It can act as a useful resource when students' need to research topics of interest for their project or to use a number of the available databases to accumulate relative data in order to analyze relationships and or trends that may exist.

THE ROLE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Applications such as graphic design, animation, photography, audio and video software can be used to support various methods of inquiry in communications technology courses. Where appropriate, students are encouraged to use technology tools that enhance and engage them in the learning process.

CAREER EDUCATION, COOPERATIVE EDUCATION, AND OTHER FORMS OF EXPERIENTIAL LEARNING

Teachers will promote students' awareness of careers involving technological education by exploring applications of concepts and providing opportunities for career-related exploration.

Cooperative education and other workplace experiences, such as job shadowing, field trips, and work experience, enable students to apply the skills they have developed in the classroom to real-life activities.

SPECIALIST HIGH SKILLS MAJOR

Technological Education courses are well suited for inclusion in programs leading to a Specialist High-Skills Major (SHSM) or in programs designed to provide pathways to particular apprenticeship or workplace destinations. In an SHSM program, technological education courses can be bundled with other courses to provide the academic knowledge and skills important to a particular industry sectors and required for success in the workplace and postsecondary education.

HEALTH AND SAFETY

For the safety of all students and teachers, it is important to abide by all health and safety regulations while either in or out of the classroom. Any health and safety issues should be reported immediately to the administration.

CHARACTER EDUCATION

Good character forms the cornerstone of a civil, just and democratic society. Development of good character is a shared responsibility of students, staff, families and the extended community. All members of society should embrace opportunities to model, teach, promote, and celebrate good character. The York Region District School Board believes that character can be both taught and learned and contributes to the social, emotional and academic development of the whole child

The attributes are: respect, responsibility, honesty, empathy, fairness, initiative, perseverance, integrity, courage, and optimism.

HEALTHY SCHOOLS

Quality instruction provides students with a wide range of opportunities to learn, practise, and demonstrate knowledge and skills related to living a healthy life.

A safe and healthy physical environment improves the
conditions for learning. A supportive social environment has a positive impact on students' learning. Students are responsible for recycling, reusing and minimizing their educational imprint in conserving resources.

ASSESSMENT &EVALUATION OF STUDENT ACHIEVEMENT

THE ACHIEVEMENT CHART & THE 4 CATEGORIES

The categories, defined by clear criteria, represent four broad areas of knowledge and skills within which the subject expectations for any given course are organized. The four categories should be considered as interrelated, reflecting the wholeness and interconnectedness of learning.

The categories of knowledge and skills are as follows:

Knowledge and Understanding – Subject-specific content acquired in each course (knowledge), and the comprehension of its meaning and significance (understanding).

- Knowledge of content
- Understanding of mathematical concepts

Application – The use of knowledge and skills to make connections within and between various contexts.

- Application of knowledge and skills in familiar contexts.
- Transfer of knowledge and skills to new contexts.
- Making connections within and between various contexts.

Thinking/Inquiry – The use of critical and creative thinking skills and/or processes, as follows:

- planning skills (e.g., identifying the problem, selecting strategies and resources, scheduling)
- processing skills (e.g., analysing and interpreting information, reasoning, generating and evaluating solutions, forming conclusions)
- critical/creative thinking processes (e.g., problem-solving, design, and decision- making processes)

Communication – The conveying of meaning through various forms.

- oral (e.g., role play, discussion, presentation)
- written (e.g., design briefs, work orders, technical reports)
- visual (e.g., technical drawings, flow charts, graphics)

The evaluation for this course will be based on**:** *Growing Success, 2010; The Ontario Curriculum, Grades: Department, Year Published*; *Guidelines for Assessment and Evaluation for York Region Schools, 2001* and will include the following:

Application.....35%

Thinking/Inquiry.....15.0%

Communication..... 10.0%

Knowledge/Understanding..... 10.0%

Cross-Curricular Task.....5.0%

Culminating Project 25.0%

Learning Skills& Work Habits

Learning Skills will be assessed using observations, conversations with self and peer assessments to provide evidence of growth and understanding in the six skill areas.

Student progress will be reported with a mid-term report and a final report will be given at the end of the semester. Both reports will include a numeric grade, a summary of the student's learning skills and work habits, and anecdotal comments regarding strengths and next steps for improvements.

Course Curriculum Strands

- Technological Design Fundamentals
- Technological Design Skills
- Technology, the Environment, and Society
- Professional Practice and Career Opportunities

Unit Outlines

- Unit 1 Outline - Safety
- Unit 2 Outline - Design & Problem Solving
- Unit 3 Outline - Design & Prototyping
- Unit 4 Outline - Architecture
- Unit 5 Outline - Rapid Prototyping

Unit 1: Safety

Students plan and produce environments for information displays using a variety of software, hardware, and physical materials. They create display spaces and employ electronic resources in the production, presentation, and distribution of information. Students apply ethical standards and policies in their productions as they explore further education and career opportunities. Students also learn about safety in the classroom through the Ontario Safety Passport Test.

A) Learning the PC Environment

Targets:

- **Students will know how to search, open, and save files on a PC/Mac.**
- **Students will understand how to use core programs on a PC/Mac.**
- **Students will learn to save time and be efficient using a PC/Mac.**

-We teach students how to search, open and save documents. We also show them how to navigate through programs, specific programs for technological design and shortcuts to save time and improve efficiency. We teach students how to organize their digital documents on the PC.

B) Copyright Laws

Targets:

- **Students will learn Canadian Copyright Laws in regards to music, image and video production**
- **Students will understand the difference between copyright infringement and acceptable use policies.**

-We teach the students to create their own music or ask permission from the owner.

Unit 2: Design & Problem Solving

In this unit students are presented with a problem and must come up with a viable solution. Assessed on the practicality of their product; and research from their spice report.

A) Catapult Challenge

Targets:

- **Students are challenged to build a catapult with minimal resources.**
- **Using popsicle sticks, elastics and hot glue who can launch a rubber ball the furthest.**

-We teach the students about design principles, refresh newton's three laws and help foster a healthy competition within the first week of class.

Unit 3: Design & Prototyping

This unit introduces students to the technology required to communicate graphically through computer aided design (CAD) software. Students learn and apply design elements and principles by creating concept sketches, scaled sketches and CAD sketches. Students are shown how to draw to 1:1 scale and watch their drawings come to life with a foam prototype.

A) Imperial vs Metric

Targets:

- **Students will be able to explain the difference between using the imperial measurement system and metric measurement system.**
- **Students will learn fundamentals of graphic design terminology.**
- **Students will write a quiz to solidify their understanding.**

-We teach students the fundamentals differences between imperial and metric, a cornerstone of understanding how structures are built accurately and to code.

B) Spice/Design Reports

Targets:

- **Students will be able to explain the need for a spice/design report.**
- **Students will be able to explain the different types of support structures.**

-We teach students about structures and let them discover hands on the best structure to construct a bridge based on the requirements given. Support materials include PowerPoint presentations and hands-on lessons and computer simulations.

C) Sketching (Concept, Scaled)

Targets:

- **Students will be able to explain the difference between a concept sketch and a scaled sketch.**
- **Students will learn fundamentals of graphic design terminology.**
- **Students will write a quiz to solidify their understanding.**

-We teach students the fundamentals of sketching and how concept ideas are brought to life. CAD software helps students to bring their concepts to an accurate prototype.

D) Prototyping

Targets:

- **Students will cut and model their remote to look like their sketch.**

- **Students will use safe procedures to cut and build their prototype.**

Unit 4: Architecture

Students apply basics skills to create and build a modern contemporary model house. Using correct terminology, measurements and planning their floor plans are done in a 40:1 scale. Using a combination of CAD software (google sketchup) and hand drawn floor plans students understand what it takes to build a dream floor of their house.

A) Basics architectural skills

Targets:

- **Students will learn the basic components that make up a floor plan.**
- **Students will learn how to differentiate between different features of a floor plan (i.e. walls, windows, fixtures etc.)**
- **Students will learn how to draw a bubble floor plan**
- **Students learn the basics of how to use google sketchup (toolbar, views, sizing etc.)**

-We teach students the basics of architecture. Students follow teacher led video tutorials to further explore the program. Students will successfully complete each tutorial to create various images on their own. Activities include: Creating shapes and eventually a neighbourhood in google sketchup.

B) Creating a 3D Model

Targets:

- **Students will create their own 3D house model based on their scaled drawings.**
- **Students will use the Internet and class tutorials to foster life long learning for the 21st century student.**

-We teach students how to use equipment safely and how to help build their 3D model house proportionately, to scale and with success. This unit helps teach students to think critically, solve problems and follow specific directions. The goal for our students is to take pride in their work, let their imagination run wild and utilize the technology that is available to them with the resources in and outside of the classroom.

Unit 5: Rapid Prototyping

Students are introduced to industry standard 3D modeling CAD software, Sketchup. Students learn the basic fundamentals to produce a customizable chess set. Students apply ethical standards and policies in their productions while exploring further education and career opportunities.

A) Introduction to Sketchup

Targets:

- **Students will understand the basic fundamentals and process of Sketchup.**
- **Students will understand the use/benefit of Rapid Prototyping.**
- **Students will be introduced to the environmental impact of plastics.**
- **Students will understand what Rapid Prototyping is and how it is used in industry.**

-We teach students the effects of plastic on the earth. We teach students how to use Computer Aided Design (CAD) programs to Rapid Prototype (RP) models and why RP is used in the industry.
-Students RP model will be a customized chess set