BOSS SCHOOL OF TECHNOLOGY
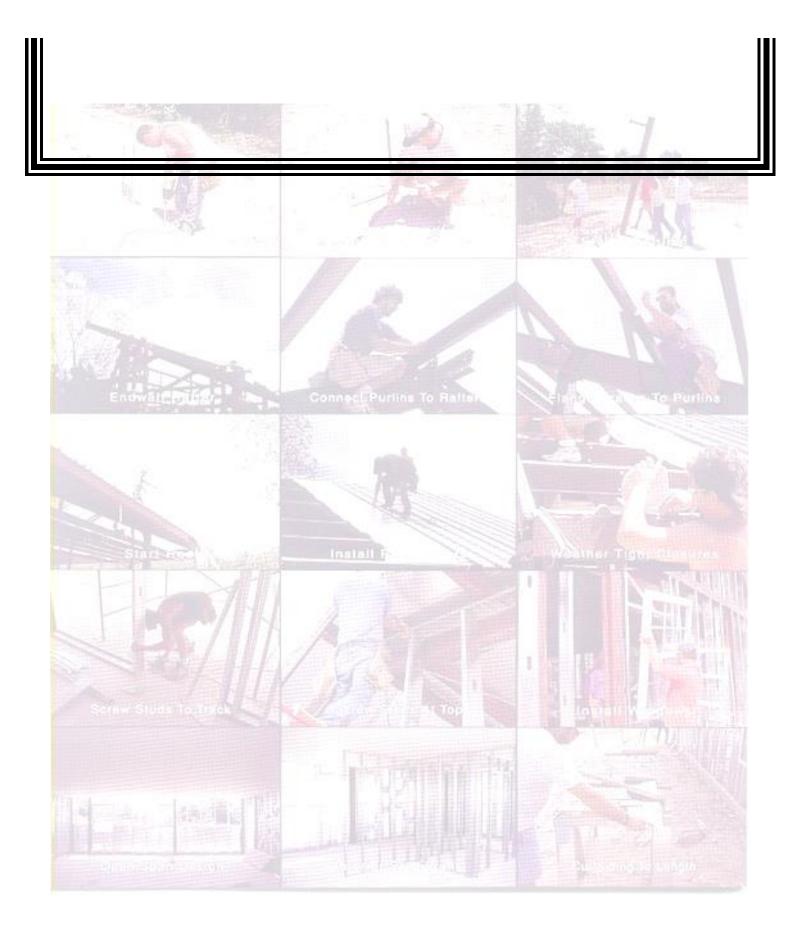## SKILLS FOR LIFE

Success For All

Technological Design
Grade 12
TDJ4M

Mr. George A. Niles

Technological Design, Grade 12

Course Description

This course introduces students to the fundamentals of design advocacy and marketing, while building on their design skills and their knowledge of professional design practices. Students will apply a systematic design process to research, design, build, and assess solutions that meet specific human needs, using illustrations, presentation drawings, and other communication methods to present their designs. Students will enhance their problem-solving and communication skills, and will explore career opportunities and the postsecondary education and training requirements for them.

The skills that are learned throughout the course develop a base that prepares students for **direct entry into the workforce, apprenticeship programs or other training programs**. The **student-centred, activity-based mode of delivery** provides students with opportunities to **develop individual and group skills, time management skills and to demonstrate the ability to design and follow an organizational plan for the completion of a range of different tasks**.

Each unit provides the opportunity for students to have exposure to many career opportunities and provide insights into the skills required for related professions. A variety of teaching/learning strategies are employed in the classroom to allow for career orientation (i.e., job shadowing, computer career and education research, field trips, and guest speakers).

Students will complete a variety of individual tasks and participate in team activities that are project - based. Every project is designed with sufficient in class time to accommodate all students. Since the lab simulates a work environment **all production and post production stages must take place in the classroom.** This facilitates on going coaching and evaluation critical to student progress. Course delivery will utilize current shop equipment.

Students will have the opportunity to develop personal, professional and production skills, as well as theoretical and life long transferable skills through the use of various types of construction technology equipment. The application and development of construction technology will enable students to complete challenging and advanced projects.

GENERAL AIM:
It is the general aim of this course to prepare students in such a manner that they **develop productive work habits, and proper social skills for future levels of education, employment and citizenship**. Through the combination of communication and technical proficiency skills, **it is the intention to instill pride, workmanship and a sense of real accomplishment within their total education experience**.

In this course, students are given a variety of progressive challenges to encourage creative, fully rationalized solutions. Activities can be teacher- or student-driven and are undertaken on an individual or group basis.

It should be noted that the "design process" (identify the problem, identify related criteria, develop possible solutions, test ideas, produce a solution, and evaluate), is really a development process or cycle. Design is the "front end" to the development process and permeates the entire cycle of developing products and environments. To illustrate this, designers do not ask how they can develop a better mousetrap; they ask why a mousetrap is needed in the first place.

Designers examine a situation and ask the following questions:
- Who has a need, a change in need, a problem, or a situation that could be improved through design?
- What has changed to lead to this need or problem?
- Why does this need or problem exist?
- When and where does this need or problem occur?
- How can the situation be improved?

The prime directive in design is problem solving. Design begins with identifying a situation or problem that relates to a need or a change in need. An important aspect is the continual process of testing, rationalizing, and analysing to ensure the best solution to a given problem is developed.

Curriculum Strands	Overall Expectations
Fundamentals	A1. demonstrate an understanding of criteria, relationships, and other factors that affect technological design and the design process;
	A2. describe strategies, techniques, and tools for researching, organizing, planning, and managing design

		projects and related activities, with an emphasis on advocacy, diplomacy, and marketing; A3. demonstrate an understanding of drafting standards, drawing types, conventions, and guidelines used when representing design ideas graphically; A4. demonstrate an understanding of various types of models and prototypes, and describe the tools, materials, equipment, and processes for building, testing, and evaluating them; A5. use appropriate technical language and communications methods to document, report, present, and market design ideas and results.
Skills		B1. use appropriate resources, methods, and tools to research and manage design projects and related activities; B2. apply appropriate methods for generating and graphically representing complex design ideas and solutions; B3. create, test, and analyse models and/or prototypes, using a variety of techniques, tools, and materials; B4. use a variety of formats and tools to create and present reports summarizing and evaluating the design process, to analyse decisions made during the process, and to advocate the final design.
Environment and Society		C1. demonstrate an understanding of environmentally responsible design practices, and apply them in the technological design process and related activities; C2. analyse the relationship between society and technological development.
Professional Practice and Career Opportunities		D1. describe and apply personal and environmental health and safety standards and practices related to technological design; D2. compare a variety of careers related to technological design, as well as the training and educational requirements for them, and maintain a portfolio of their work as evidence of their qualifications for future education and employment.

This course is divided into five units, each unit representing progressively more student responsibility and effort.

UNIT DESCRIPTIONS

UNIT	UNIT TITLE	
1	**Unit 1 – Drafting / Drawing / Sketching /Product Design**	
2	**2D Computer-Aided Design (AutoCAD) – Assembly Drawings**	
3	**Architecture – designing a home**	
4	**Landscape Design/Interior Design**	
5	**Mechanical and Industrial Design**	

Assessment/Evaluation Techniques

Methods of assessment and evaluation include a wide variety of approaches to enhance the learning environment. Assessment methods may include: performance assessments such as project deliverables and skill demonstrations; personal communication assessment such as instructional questions and answers, conferences, classroom discussions, journals, or log books; and standardized tests such as classroom tests or examinations. Self- and peer assessment assist the student by providing directions to improve performance. Assessment charts included in each activity provide the basis for teacher evaluation rubrics, student self-assessment, or team assessment tools.

Assessment and evaluation tasks may include:
- composition of design briefs (research and analysis);
- composition of design proposals;

- technical and/or design reports;
- research reports (including photos of product in use);
- drawings, illustrations, and/or blueprints;
- finished models, prototypes, test models, and products;
- presentations;
- competition deliverables;
- daily log or work journal.

EVALUATION:

Once the preliminary theory has been taught regarding the project introduction and theory surrounding this course. The course will be student directed by 80%. In the case of team assignments, the group will organize and plan their time to execute required assignments. Students will evaluate their personal work, and the work of their colleagues. The teacher will evaluate final product and work skills on all assignments, presentations and exams

An evaluation sheet with clear assignment instructions, due dates, and evaluation scheme will accompany all assignments. Grades will be based upon the following:

- **Practical Projects Application**   **25 %**
  - Includes research, design, fabrication, safety and the final product
  - Individual & Team based assignments

- **Thinking & Inquiry**   **25 %**
  - Includes various assignments (research, short answer, text questions, essay etc.) tests (to assess theoretical & practical aptitude) and technology portfolio (notebook) and Independent Study Unit.

- **Knowledge & Understanding**   **25 %**
  - - Includes working habits, organizational skills, participation in class lessons, co-operation with others, teamwork, professionalism, self - management, completion of daily work logs, general attitude towards class.

- **Communication**   **25 %**
  - - Activity exercises, presentations

- **Summative, Portfolio and Final evaluation**

   The Summative or Final evaluation for the course occurs near the end of the semester and accounts for 30% of the students over-all mark for the course. In this course the Summative evaluation consists of a practical challenge and the presentation of a portfolio that effectively communicates the student's abilities, knowledge and thinking skills in this subject.

LAB AND CLASSROOM POLICY:

- **Attendance:**
  Students who are absent for part or all of a class may suffer in the evaluation process.   Students are responsible for work covered during any absence, and can expect to be evaluated on all work in the course. Students with unauthorized absences will be given a mark of zero on evaluations. Persistent absence may place the student in jeopardy of losing the credit.

  Sometimes absences from class are unavoidable.   It is the student's responsibility to find out what they have missed. Encourage students to get two learning partners.

- **Partner System:**
  It is highly recommended that all students pair up with a class partner. This should be someone who is responsible and who will regularly attend class. In the event that a student is absent or late for class, this partner will pick up notes, homework, and be able to update the student about all class lessons & events. It is the responsibility of each student to be aware of all that is occurring in the class.

- **Late Assignments:**
  All assignments must be handed in on time.   Since "Process" is as important as "Product" incomplete work should still be handed in on the due date and will be assessed using the same Rubrics. It may not be possible to work on parts of your projects at home. Some projects are a group effort. It is, therefore, very important that you attend every day. Limited opportunity may be available in class for catching up. The lab may be available, by appointment before and after school.

Missed Summative Evaluations
(Tests, Assignments, Performance Activities)
Teachers will clearly identify the summative evaluations that will be used to arrive at a final grade. **It is the responsibility of students** to provide evidence of learning by preparing, completing, and submitting each summative activity within the prescribed timeframe. When no evidence of achievement has been provided by the student, a mark of zero will be assigned. In order to minimize missed opportunities for demonstration of learning, students must inform teachers, in advance, of any planned absence (field trip, sporting event) in order that alternate arrangements can be made. Students who skip summative evaluations will receive a mark of a zero.

Group Work
- When students complete a project as a group, all students in the group will not necessarily get the same mark.
- Various strategies will be used to assess the contributions of the Group members such as: work sharing statements, teacher interviews, individual portfolios, and observations.

Tests & Quizzes
Students will be given one week's notice for all tests and quizzes. Students who miss a test or quiz may be given a mark of zero without a valid reason for their absence. Students may not write a previously administered test or quiz.

Bonus or Makeup Assignment
The Tech Department does not offer students bonus marks or makeup assignments to boost their marks.

Ethics & Honesty:
This policy is based upon two issues:
1. Any **plagiarism**, copying of student work or academic dishonesty will **result in a grade of zero for the perpetrator and possibly the originator**. **School administration and parents will be notified.**

2. Any work that is produced within this course is expected to contain positive images of race, gender, language and religion. References to drugs, alcohol, or profanity in a video or in musical accompaniment is unacceptable. **Negative stereotypes, acts of violence, sexual themes, or the use of profanity in your work is unacceptable and will result in a mark of zero.**

3. Tech courses are practical courses where students develop and apply their skills. **Teachers will continuously assess student skills and provide guidance and feedback.** Students must get their teacher's approval before completing any work at home. Any work completed at home without the teacher's approval will not be assessed.

Students are responsible for:
- providing evidence of their achievement
- demonstrating academic honesty
- completing work to the best of their ability
- submitting work to teachers on time
- attending classes and being active participants in the learning and assessment process
- communicating with teachers when there is difficulty in meeting timelines
- ensuring that missed work is completed within pre-established timelines
  - communicating with parents assessment & evaluation methods, and pertinent due dates and timelines for work submission.

Lab Policies:
- Please do not bring any coats or knapsacks into the class, leave them in your lockers.
- Absolutely no food or drinks in class
- Never adjust hardware, peripheral devices or software on any equipment, unless authorized by the teacher.
- Save all materials to your student folders, or on a disk. Internet is for academic use only.
- Remember, if you do not use class equipment properly, you may not be able to complete your work.
- As per the ECSS student handbook, No communication devices are to be played on school property without the authorization of the teacher. Tape and CD players, Gameboy(s) or the like, cell phones, pagers etc. are not permitted at all and may be confiscated at the school's discretion.
- All students are required to adhere to the following at all times in the Construction Shop:
  - Wear safety glasses at all times
  - Wear only closed toed shoes
  - Wear Hard Hats
  - Remove all jewellery
  - Tuck in clothes and roll up long sleeves
  - Follow all safety rules.

- Do not be under-dressed
- Be ready, prepared, alert

Safety Awareness

Personal Protective Equipment [PPE]
1. Avoid wearing loose, baggy clothing or personal accessories, such as watches, chains, rings, or other jewellery, or ties. **Students wearing shorts, sweaters, high heels or sandals will not be permitted in the shop.**
2. Wear safety glasses, shields and gloves and other PPE as per instructed.
3. Long hair is to be tied back away from the face.

Lift Support and Movement
1. Move a heavy load only with teacher approval.
2. Use assistance to lift items over 20 kilograms (40 pounds) or two metres (six feet) in length,
3. Secure and support heavy and long loads with approved stands only.
4. Lift properly, legs not back.

Machine Tools and Energy
1. Do not direct compressed air or gases towards anyone or towards exposed skin or clothing.
2. Operate equipment, tools or machinery only after receiving proper instruction and permission from the teacher. A valid passport to safety must be in effect.
3. Never leave equipment or machinery running unattended.
4. Do not attempt to repair any electrical or mechanical connections.
5. Lockout any equipment which is being repaired.
6. Lockout and tag any equipment prior to repairs.
7. Notify the teacher if you suspect any hazards on or around the machine

Storage and Handling of Compressed Gases
1. Complete WHMIS, symbols and recognition instruction.
2. Maintain all cylinders in an upright position, chained and secured with valve caps installed
3. Change gas bottles only with teacher supervision.

Storage and Handling of Chemical Substances
1. Understand and follow WHMIS, and MSDS instruction before handling chemical substances.
2. Secure all flammable and corrosives in approved cabinets.
3. Maintain good housekeeping practices when dealing with chemical substances.

Waste Disposal and Recycling
1. Be responsible for cleaning up workstations, tools and the shops.
2. Sort waste by category as required using approved containers.
3. Sort recyclable liquids and solids into proper approved storage container

Engineering Log Sheet

STUDENT: _____	COURSE: _____

Date	Hours	Project	Activity Performed	Teacher Signature
Total Hours		Student Signature/date: Instructor Signature/date:		

Design Report Format

The Design Report consists of the following:

1. **Title Page**
   The title page is used to grab the attention of the reader. As such, it should contain some form of illustration that appeals to the reader. It should also contain the name of the report, the name(s) of the person(s) who produced the report, for whom the report has been prepared, and the date of production.

2. **Problem Statement**
   The problem statement describes the identified needs and situation of the project at hand. This statement is very brief (approximately one or two sentences).

3. **Design Criteria**
   This section outlines the set of factors that influence the design (e.g., cost considerations, size limitations, user requirements, material or component properties, etc.). This section guides the design. It may be in point form, but as much detail as known should be here.

4. **Procedure Notes**
   This is an in-depth account of the process used in the design and fabrication of the product. The sentences in each paragraph should be kept short and to the point. It describes the route used to determine the solution to the design challenge, including research conducted, sources of information, modelling and testing of ideas and their results.

5. **Materials**
   List all the materials and costs used in the fabrication of the final product.

6. **Drawings or Illustrations**
   Include all drawings or illustrations that were used in the development and fabrication of the project. This includes rough sketches, technical drawings, illustrations, and/or photographs of models or products. Ensure all drawings are properly labelled and descriptive.

7. **Conclusion**
   Describe the results of the process of finding a solution to the design challenge. Include the results of testing solutions. Include a description on how each of the design criteria was met (or not). Describe possible improvements or modifications for future work. Suggest other users or situations that may benefit from your research and/or testing.

8. **References**
   List all reference materials used to complete the project, including books, articles, interviews, and Internet sources.

9. **Log Sheet**
   From your daily log records, list the dates and amount of hours taken for each facet of the project.

Equipment Sign Out Agreement

Dear Parent/Guardian:

Your child is enrolled in our Communications Technology course at Bur Oak Secondary School. During the semester, your child will be using various electronic devices such as digital cameras, and sound recording devices to complete their assignments. We encourage students to complete their work within class time. However, your child may need to sign out equipment to use outside the class to complete their assignments.

The equipment they sign out is expensive and delicate. We ask that students:-
- Take extra care when transporting and handling equipment.
- Do not subject the equipment to anything that could damage it (e.g., physical shocks, liquid spills, excessive cold or heat, rain, snow, smoke, etc.).

Students are responsible for the replacement cost of the equipment if it is lost or if damage is due to negligence. They must return the equipment with all associated accessories (e.g.,batteries, cables, headphones, microphone clips, etc.) packed in the provided case and returned directly to the teacher. Your child is the only person authorized to use this equipment while they have signed it out. Under no circumstances should they let other persons who have not signed this agreement use or otherwise handle the equipment.

I have read the above and understand the expectations and consequences.

Student's signature: _____   Date: _____

Parent's signature _____   Date: _____