MECH 4010 / 4020

DESIGN PROJECT

HANDBOOK

2012/2013

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Table of Contents

PREFACE....5

CHAPTER 1: INTRODUCTION....6

1.1 Summary....6
1.2 Important notes....7
1.2.1 Dates are subject to change....7
1.2.3 Illness....7
1.3 Course summary....8
1.4 Weekly schedule....10

CHAPTER 2: DELIVERABLES....13

2.1 Project selection....13
2.1.1 Proposing a project....13
2.1.2 Project ideas....13
2.1.3 List of project ideas....14
2.1.4 Submitting a project idea....14
2.1.5 What makes a good project idea....14
2.1.6 What do you need for a complete proposal....15
2.1.7 E-mail to design project coordinator....15
2.1.8 Things you need to consider before you submit your memo....15
2.2 Design requirements memo....20
2.3 WWW Pages....22
2.4 Design selection memo....24
2.5 Presentations....25
2.5.1 Mandatory presentations....26
2.5 Design notebooks....35
2.6 Build vs. No-build projects....38
2.7 Build/design reports....39
2.7.1 Meeting with the technicians....39
2.7.2 Gantt Chart....39
2.7.3 Brainstorming....40
2.7.4 Budget....40
2.8 Term reports....45
2.9 Device design/testing....47
2.10 Inspection....49
2.11 Team participation memo....50

CHAPTER 3: RULES AND REGULATIONS....51

3.1 Working rules....51
3.2 Meetings....52
3.3 Team participation....52
3.4 Safety rules....53
3.4.1 Fabrication safety rules....54
3.4.2 Testing safety rules....55
3.4.3 Vehicle testing safety rules....56
3.4.4 Safety rules agreement....57
3.4.5 Safety in winter term....58
3.5 Reimbursement procedures....59
3.6 Departmental faxing policy....63
3.7 Departmental printing policy....64

CHAPTER 4: RESOURCES.....65

4.1 Design studio.....65
4.1.1 House rules.....65
4.1.2 Tool boxes.....65
4.1.3 Design studio manager.....65
4.1.4 Lock combination.....66
4.1.5 Voice mail.....66
4.1.6 Studio tables.....66
4.2 Departmental technicians.....66
4.3 What is expected of you during, design, fabrication and assembly. 66
4.4 Student use of departmental shops.....67
4.5 Assigned technicians and assigned hours per month.....67
4.6 Walk-in day.....67
4.7 Engineering drawings.....68
4.8 Modifications and rebuilds.....68
4.9 Cad training.....69
4.11 Departmental keys.....69

CHAPTER 5: EVALUATION.....70

5. 1 Design selection evaluation sheet.....71
5.2 Build/design report evaluation.....72
5. 3 Report evaluation sheets.....77
5.4 Lab book evaluation sheet.....79
5.5 WWW page evaluation sheet.....80
5.6 Student Participation evaluation.....81
5.7 Device testing evaluation sheet.....82
5.8 Mech4010/4020 – Design Project I/II – Ranking by students 83
5. 9 Mech4010/4020 – Design Project I/II – Evaluation by Professors 84
5.10 Feedback.....85

APPENDICES.....86

A.1 Sample design project agreement.....87
A.2 Sample design project waiver.....90
A.3 How should potential clients propose a a design project idea.....92
A.4 Construction ideas.....93
A.5 Safety Manual.....96

BASIC RULES.....97

INFORMATION ABOUT THE SHOP.....98

GENERAL SAFETY GUIDELINES.....99

GUIDELINES FOR CLEANING.....101

A.6 Report writing.....102

PREFACE

This handbook is a revised version of the one produced by Dr. Ted Hubbard (last revision 2007). His help and generosity are appreciated.

Professor Emeritus Dr. Orest Cochkanoff, who joined the Nova Scotia Technical College in 1953, recounts that at that time students in their senior year were required to design the layout of steam power plant. This design project evolved in the 60's to allow other Thermodynamics related topics. In the 70's the course requirements changed again and students started to work in groups under the supervision of different professors on a wider range of topics, including some topics suggested by the students themselves. In the early 80's the design project course underwent another change with the inclusion of an even wider range of topics, including the construction of prototypes and final presentations in a conference format. Since then, the design project course has progressed in an almost exponential manner, partly because of the recognition by students and professor of its importance and the availability of more modern resources such as: computers, 3d modeling software, NC machines and more importantly money. Today most groups are expected to build a prototype and test it.

The faculty, staff and students in our department have always dedicated themselves with enthusiasm to this class. With the passage of time we have realized that this class offered teaching opportunities besides "design", which include some very important skills, required by a professional engineer, such as: project management, working in a group under a supervisor, writing technical reports, learning about safety, and presenting and defending their design in public.

Julio Militzer
July 2012

Note to readers: If you notice an error or have suggestions for the improvement of this handbook please send an e-mail to jmilitze@dal.ca. Thank you.

DISCLAIMER

"Although care has been taken in preparing the information contained in this document, Dalhousie University does not and cannot guarantee the accuracy thereof. Anyone using the information does so at their own risk and shall be deemed to indemnify Dalhousie University from any and all injury or damage arising from such use."

CHAPTER 1: INTRODUCTION

1.1 Summary

Design is a major component of the curriculum of any engineering discipline, but it is foremost in Mechanical Engineering.

One of our goals with this handbook is to provide tools to supervisors and students to produce a good quality design project. With this objective in mind we have divided the notes in topics that cover the following aspects:

- Design project selection, which includes not only the topic but also the supervisor;
- Defining objectives.
- Intellectual property
- Web page
- Work discipline, setting up weekly meeting with supervisor and others within the group.
- Milestones and deliverables.
- Evaluating and providing feedback.
- Budget and financing
- Resources
- Building and testing.
- Safety
- Presentations
- Final evaluation by supervisors and peers.
- Awards

1.2 Important notes

1.2.1 Dates are subject to change

This handbook contains dates and times, scheduled many months in advance. Dates/times have been highlighted in gray. Due to unforeseen circumstances, it may be necessary to change some dates, times and/or locations of events. In the event of a date/time/location change, students will be notified in advance by email or hard copy and the changed dates will take precedence over the schedule in this handbook.

End of term presentations are mandatory for all students (see Presentations section of this handbook). Presentations will be held at the end of term / exam period, exact date TBA.

Students should not make conflicting travel plans or appointments for the end of term or exam period

1.2.2 Continuity of design project I & II

The Mechanical Design Project is a two term (8 month) project. MECH 4020 is a direct continuation of MECH 4010: students must take 4010/4020 in consecutive Fall/Winter terms. Students are not permitted to split up the terms or split the work into 2 projects. Students who fail to complete MECH 4010 or MECH 4020 will be required to repeat both project courses from the beginning.

1.2.3 Illness

In cases involving serious medical illness of students, all matters shall be resolved in consultation with the Associate Dean's Office as per departmental and faculty policies and regulations.

1.3 Course summary

Fall/Winter 2012/2013

Design Project I This class develops the use of fundamental theory in the detailed design of a design project, suitable selected by the student(s) in consultation with the department. The students are expected to take the project from its preliminary stage through the various design stages to the ultimate completion of the design, which include a detailed report with calculations, drawings, possibly a prototype and an oral presentation.

Design Project II This class is a continuation of Design Project I leading to a final report and formal presentation. The presentation will be made to fellow students and departmental staff members prior or on the last day of lectures.

More information can be obtained from the course web page : http://www.me.dal.ca/

Course instructor: Dr. Julio Militzer
Room 364 C Building, Sexton Campus
e-mail: jmilitze@dal.ca

Class times

Mech4010 ; Mon/Wed/Fri 11:35AM to 12:25 PM in room B227
Mech4020 ; Mon/Wed/Fri 11:35AM to 12:25 PM in room B227

Important note:

Classes will only be held when students are advised via e-mail, usually 24 hours before the scheduled class.

Grading:

	1st Term		2nd Term	
	Design Requirements	5%	Build/Design Report Final	15%
	Design Selection	10%	Late Inspection up to -5%	
	Build/Design Report	15%	Test results	10%
	Dec. Project Report	30%	Final Project Report	30%
	Design Log Books	10%	Design Log Books	10%
	Web page	5%	Web page	5%
	Participation	5%	Participation	5%
	Dec. Presentation	10%	Final Presentation	15%
	Top 5 rank by students	5%	Top 5 rank by students	5%
	Top 5 rank by profs	5%	Top 5 rank by profs	5%

Presentations_

Students must complete the Dec. Presentation to pass Design Project I.
Students must complete the Final Presentation to pass Design Project II.

Reference vs. Plagiarism
If you use materials from a book or another source as reference you must properly cite the source. Failure to do so is plagiarism and will result in failure. We all have an intuitive knowledge of plagirism means, however, for your sake it is important that you understand what Dalhousie considers plagiarism and how it deals with it. To inform yourself go to http://www.dal.ca/dept/university_secretariat/academic-integrity.html.

Safety:
Safety is the main priority. Failure to follow safety procedures may result in a grade of F.

Note: Design project marking

This is a design course; there is no unique right answer.
You should not expect a perfect 100%.

If you submit a good answer, you will get a good mark.
But if you want the best mark, you have to make the best submission.
Your submission is compared to your classmates.

The assignments I hand out are the minimum I expect from the teams,
simply meeting these minimum requirements will not entitle you to a high score.

If a team does more, they will get more.

Design is about making decisions.

Often design problems come with only partial or initial information.

A very important part of the design process is deciding what you feel is most important.

You have a lot of freedom of choice and I expect you to make decisions as to what you submit.

I will tell you what your assignments are, I expect you to decide how best to do them.

Part of your task is deciding for yourselves how best to meet the assignment goals.
I will give provide general guidelines, but not a formula to do every little step.

This is a course about decision making, creativity, organization, self-motivation and initiative. These will be expected and rewarded.

1.4 Weekly schedule

Note: The weekly schedule gives you a record of what you have to deliver and when. Check it often.

FALL TERM 2012

		Date	Value	Handbook page
Weeks 1&2	Tentative Teams / Advisors	**Sept 11-17**		
	Assigned Teams / Advisors	Sept 20-21		
Weeks 3&4:	**Design Requirements DUE**	Oct 1	**5%**	
	Short in-class project intros	Oct 1		
Week 5:	Brainstorming / Idea Generation			**36**
Week 6:	Brainstorming / Idea Generation			**36**
Week 7:	Brainstorming / Idea Generation			**36**
Week 8:	Brainstorming / Idea Generation			**36**
Week 9:	**Design Selection DUE**	Nov 7	**10%**	**21**
Week 10:	Design refinement			**21**
Week 11:	**Build/Design Report I DUE including detailed budget**	Nov 19	**15%**	**35**
End of Term	**Dec. Project Report DUE**	**Dec 4**	**30%**	**39**
	Lab Books DUE	Last day of classes	**10%**	
	WWW page DUE		**5%**	
	Team Participation		**5%**	
End of Term	**Dec. Presentation DUE**	**Dec 3 and 4**	**10%**	**22**
	(Arch. Auditorium, H Building)	1/2 day		
	Top 5 rank by students		**5%**	
	Top 5 rank by profs		**5%**	
		TOTAL:	**100%**	

WINTER TERM 2013

		Date	Value	Page
Week 2	Meeting with technician and coordinator to discuss final drawings	Jan 9th,11th and 14th		**35**
Week 3:	**Final Build/Design Report DUE**	Jan 18	**15%**	**35**
Week 11:	**Inspection**, Testing	No later than Mar 16		**43**
Week 12:	Testing, Fix			
End of Term	**FINAL Project Report DUE**	**Apr 8th**	**30%**	**39**
	Lab Books DUE	Last day of classes	**10%**	
	Test Summary DUE		**10%**	**41**
	WWW page DUE		**5%**	
	Team Participation		**5%**	
End of Term	**FINAL Presentation DUE**	**End of Term**	**15%**	**22**
	(Arch. Auditorium H Building)	**Thurs. Apr 4th and Fri. 5th** afternoons		
	Top 5 rank by students		**5%**	
	Top 5 rank by profs		**5%**	
		TOTAL:	**100%**	

CHAPTER 2: DELIVERABLES

In this chapter we list all deliverables. Deliverables are all documents, devices and presentations that have to be given by each group. Please read carefully all the instructions and do not miss any of the deadlines. The dates are summarized in 1.4 Weekly Schedule given above.

2.1 Project selection

2.1.1 Proposing a project

The first step in any design project course is project selection. This includes not only the topic but also a willing group of students and a suitable supervisor. Students can choose a topic from the list of proposed projects published on the course web page. The projects are proposed by either professors, students or outside clients and are available on the course web site well in advance of the beginning of classes. The main reason is that the choice has to be made as soon as possible after classes start. We require this process to be completed by the first week of classes, so that supervisors and students can start their design as soon as possible.

2.1.2 Project ideas

Project ideas can be proposed by professors, students or clients up until the final day of project selection, which is at the end of the first week of classes. A project idea must have the following:

- Project title: up to 12 words, but short tiles of 2 or 3 words are preferred (avoid the use of acronyms).
- Summary: 100 words maximum with a maximum of one www link reference.
- Sponsor: who pays for the construction? Note: usually it is the department that covers the cost of the construction of a prototype and other expenses. Historically the typical cost was between $1,000 and $2,000 to be covered by departmental funding. Expenses of projects sponsored by outside clients are covered by the client and are not subjected to any limits.
- Contact: name, e-mail address or phone number.
- Departmental professor interested in supervising the project (if it is known).

A summary description, usually a single paragraph, is provided on the course web site. The main requirements of a project idea are that it must have a clearly defined objective and can be successfully completed during the duration of the course. Usually research topics, which tend to be open ended, are not suitable. The project has to be feasible within the time allotted (8 months) and the resources available both technical and financial. Projects that are deemed to be too small are not acceptable. We also prefer topics that

require that a device be built and tested, since this is believed to be an important part of the design process. Usually, the device fails during the first test, and students must go back and redesign the device to fix the problem, which is considered an important part of the design process.

2.1.3 List of project ideas

The MECH department lists proposed project ideas at

http://poisson.me.dal.ca/~DP_MECH/

Each listed idea contains the following information:
Project idea Letter & Title, Summary, Contact person, Funding info, Faculty interest
If you are interested in any of these ideas, contact the person listed.
Professors will be polled in September and professor suggested projects will be posted.

2.1.4 Submitting a project idea

If you are interested in a project idea not yet listed, you must first submit a project idea. Email the following information to the DP coordinator (jmilitze@dal.ca):

Project title:	Should be short and have no acronyms
Summary:	100 words maximum (1 www link maximum).
Sponsor:	Who pays?, if known
Contact:	name & email or phone number
ME faculty interest:	profs to talk to 1st, if known

Your project idea will be evaluated by the DP coordinator, if acceptable it will be given a project letter and listed.

2.1.5 What makes a good project idea

Right Topic:
The project should be mostly Mechanical Engineering in nature. It can have other aspects (e.g. electrical engineering), but it should be primarily Mechanical. Choose a topic where the department staff and faculty have the resources and background to help.

Right Size:
Look for a project that can be completed by 4 students in 8 months (4 months planning & 4 months construction and testing). Some teams will receive technical support from our staff, but there are some things we can't do. Don't take on a project that is too big, beyond our resources or potentially hazardous. You should also not choose a topic that is too small or too easy: usually if you immediately know exactly the how to solve the problem, it is too easy and thus not suitable..

Funding:
Choose a project that is within the financial resources of the client and/or the team.

2.1.6 What do you need for a complete proposal

A project idea is not enough, you must have a full project proposal: consisting of a project idea, a team and a supervisor who is interested in the idea. You do not have a project until you a have a project number (not a letter). All students are expected to select their project early in September.
Students should email a memo ASAP to the DP coordinator with the following format:

2.1.7 E-mail to design project coordinator

PROPOSED DESIGN PROJECT

1. TEAM: list 4 student names

2. PROJECT IDEA: LETTER & TITLE only from www listing

3. ME FACULTY SUPERVISOR:
Name:_____

Confirmed __ MAYBE __YES

4. CLIENT: OPTIONAL Who pays?, contact info?

Your proposal will be initially evaluated by the DP coordinator and then by the department.

2.1.8 Things you need to consider before you submit your memo.

TEAM:
Group size is four students, and you must provide their names.

PROJECT IDEA: LETTER & TITLE
After approval by the department all project ideas and titles are posted :
http://www.me.dal.ca/~DP_MECH

Only projects listed and lettered may be selected for projects.
Design projects ideas are proposed by the department, by students or by outside clients.

SUPERVISOR:
You MUST have spoken to a ME faculty supervisor BEFORE you submit your project proposal to the DP coordinator. You can only submit a proposal if you receive a yes or maybe from a professor. The first group to approach a supervisor will not necessarily be assigned that supervisor.

NOTE: Supervisors for all projects MUST be professors in the department. Outside clients are clients. They may discuss the project with students but ultimately the supervisor is responsible for directing and evaluating the project. The department reserves the right to accept or reject clients.

DEPARTMENT:
The department will hold a meeting in mid-September to evaluate all project proposals. Projects may be accepted, modified, expanded, contracted or may be rejected outright. Supervisors may also be changed by the department.

INTELLECTUAL PROPERTY (IP)

The main objective of the Design Project is to learn the processes of engineering design. The Project Presentations and Reports MUST be in the public domain.

For the students, the issue of the Intellectual Property is secondary to the main objectives.

The owner of the Intellectual Property is free to do with the Project results what ever he/she wishes; including patent it, sell it, or give it away.

The Intellectual Property rights normally stays with the party that pays.

Authorship always remains with the inventors (students, supervisor) even when Intellectual Property rights are assigned to only one party, say the client.

For design projects proposed by outside clients the Design Requirements Memo MUST clearly assign Intellectual Property rights.

NON-DISCLOSURE AGREEMENT (NDA)

All Mech design projects must be publicly demonstrated, you have to give a public talk at the end of each term where you have to show how you solved the problem.

We have had cases where teams working for companies have signed NDA's (Non-Disclosure Agreements) and they have omitted numbers in their talks: e.g. actual formulas, amounts, recipes etc.
Any such information is usually provided to the team supervisor, but is otherwise not disclosed.

But if you are going to sign an NDA and withhold any information, that must be agreed to by the ME dept. first 2 weeks of classes.

Students must clearly state in their presentations if any information is being withheld and state the general type of information being withheld.

MONEY: Who pays what?

CLIENT (as opposed to projects proposed by professors and/or students):

The costs for expenses, supplies and outside services are the responsibility of the Client. Teams must clear any expenses with their supervisors and clients. The department provides technician help free of charge.

STUDENTS
The costs for lab books, reports and presentations are the responsibility of the students.

DEPARTMENT
The department will provide most teams with a limited amount of technician time.
The department may also be able to supply some surplus materials.

The department has limited funds available for Design Projects. The department only pays when useful hardware remains in the department, or if the teams represent the department at an event.

Teams apply for departmental funds when they prepare their budgets.

The department will NOT retroactively reimburse teams. All expenses must have prior approval by the supervisor and course coordinator. The ME office provides the proper forms. If students purchase an unauthorized item they may have to pay for it out of pocket.

To be reimbursed, fill out the reimbursement form, attach receipts and have this form signed by the team, the supervisor and the coordinator. For non-Canadian orders, remember that there may be custom/brokerage fees.

The department **will** reimburse each team about **$200 for 1st term mock-up supplies**. For example: foam core/wood/metal/plastic etc. or small parts, faxes & calling cards also are acceptable expenses for reimbursement. To obtain a refund: fill out the reimbursement form; attach receipts; and have this form signed by the team, the supervisor and the coordinator.

Teams are NOT permitted to start a tab at any supplier or vendor. Purchases must have prior approval (supervisor and coordinator). Unauthorized purchases may not be refunded.

PHONES

The Design Studio has a phone for making local calls only.
Teams may obtain $10 phone cards from the department for making long distance calls.

SPONSORS

The importance of outside sponsors is ever increasing. In the past most projects were "sponsored" by the ME Departmental funds, and as such the amount available to each team were very limited. In the last few years we have been able to secure sponsorship from Shell Canada. This external support has allowed us to provide, depending on the project between $1,000 to $ 2,000.

In addition, students have received financial support from outside sponsors as well as donation of materials or services.

To ensure continued support from our sponsors be sure to say "thank you" at every opportunity. This is important not just for you, but also for future teams so that students continue to get funding and supplies.

Where are the opportunities to thank our sponsors

Presentations:

> You must thank your sponsors in your presentations, www pages and reports.

Decals:

> Companies like to have their name visible,
> sometimes they provide decals, or we have some (see Morgyn).

Letters:

> Send a thank you letter signed by all the team members.

Photos:

> Take a photo of your team in front of your device,
> maybe mounted in an inexpensive frame, maybe with a letter.

Some of our vehicle teams send framed letters and framed photos. Companies are happy to put them on their walls and become repeat sponsors year after year.

2.2 Design requirements memo
(see 1.4 Weekly Schedule for due date)

The Design Requirements Memo must specifically list what will be done, what the deliverables are. **It should state WHAT the problem is, NOT HOW to solve it.** It should also include any specific client requirements, preferences, exclusions etc.

It must **specifically state** criteria & performance **goals,** for example:

- size, geometry, weight, complexity
- quantity
- documentation, operation instructions,
- ergonomics (human factors), safety features
- expected annual usage, life expectancy
- quality, durability, serviceability
- appearance
- cost, materials
- timing and deadlines

Intellectual Property (IP) must be addressed.
Who will be the owner of the Intellectual Property (IP) of the design?
Who will own the fabricated prototype, model, parts etc.?
The project presentations and reports MUST be in the public domain.

What is to be provided/paid by the client and what is not?
Resources from the client: time, fabrication, supplies, space, transport, publication, etc.

The Design Requirements Memo must be approved and signed by ALL 4 parties:

Team acceptance

Name.....Date.....
Name.....Date.....
Name.....Date.....
Name.....Date.....

Supervisor's acceptance

Name.....Date.....

Client's acceptance

Name.....Date.....

Coordinator's Acceptance

Name.....Date.....

CLIENT AGREEMENT

All teams with outside clients must have a written agreement of some type.

The Appendices contain a sample agreement used in the past.
You are not obliged to use this format; you may choose a longer or shorter agreement or a different agreement altogether.

Note:
This sample agreement has not been reviewed by a lawyer, and neither the Mechanical Engineering Department nor Dalhousie University makes any claims as to its suitability for your project.

CLIENT WAIVER

All teams delivering a project device to outside clients must have a signed waiver before releasing their project device. The waiver must clearly outline the liabilities for all parties involved.

The Appendices contain a sample waiver used in the past. You are not obliged to use this format; you may choose a longer or shorter waiver or different waiver.

Note:
This sample waiver has not been reviewed by a lawyer, and neither the Mechanical Engineering Department nor Dalhousie University makes any claims as to its suitability for your project.

2.3 WWW Pages

A homepage is one of the project requirements of the design project. WWW pages will be evaluated along with the Term Reports. You should create your web page as soon as you receive your team's number. Remember to update it often, typically once a week. There is nothing more frustrating than an out of date web page.

For our convenience design project user accounts have been set up on the ME servers.

poisson.me.dal.ca
or
http://me.dal.ca/~DP_MECH/

Each group will be assigned an account:
team 1 is dp_YY_01, team 2 is dp_YY_02 etc., The initial password is JulioYY (where YY stands for the current year, for example, in 2011 the password is Julio11)

Please use a secure telnet such as putty & winscp to access poisson.me.dal.ca
and change your passwd ASAP (type passwd then follow instructions).

Note: Poisson only accepts connections from the Dalhousie network so you must transfer your files from a PC on campus.

Students are expected to follow the guidelines for responsible computing at Dalhousie.

Please use your own images on the www, not copied images, if you must use an outside image, you must cite it.

FAQ

Where are the web pages kept?
Using Telnet or FTP, log onto your poisson account.
Each account has a directory called public_html/
The default page is index.htm

How do I write a web page?
The demo page shows some simple examples.
Rather than write your own www pages from scratch, you may
copy the demos and change them to include _your_ project content.

How do I transfer them back to poisson.me.dal.ca?
Use WinSCP or similar secure transfer program.

PUTTY & WINSCP

There are two programs on the desktop of the computer in the Design Studio which should be used for connecting to poisson.me.dal.ca.

The first program is called Putty and it is a secure client for opening a terminal connection to poisson.

The second is called WinSCP and it is a secure client for transferring files to poisson.

Using these programs instead of Telnet and FTP will prevent network sniffers from picking up your user names and passwords as they travel over the network.

If you need help in figuring out how they work, see Peter Jones.

DP WWW SPACE & DISK QUOTAS

There is no disk space quota on poisson.me.dal.ca.

Please try to limit your DP directories to ~100Mb, if you need more see Peter Jones.

Movies files tend to be very large. Try to use .mpeg and .wmv since they tend to use less disk space. Note: .avi's are enormous.

Also please remove all non-DP files from your DP directories.

NOTE: All DP www pages must reside on poisson, not on some remote server. Do not place videos on sites such as www.youtube.com since you have no control over it and they may removed without your knowledge.

2.4 Design selection memo

(See 1.4 Weekly Schedule for due date)

LENGTH: 4-5 pages maximum total (8.5”x11”, s.s.)

PAGE 1: Team info,
project title,
brief description of project

PAGE 2/3: Designs considered but not selected
Summary of 2-3 designs:
title of design,
brief description & sketch/image for each

PAGE 3+: Selected design:
large sketch/image(s),
description
-> Why was this design chosen?

You do not need to list all the details, but
you have to commit to 1 overall solution.

Sub parts of your design can still be a choice
between 2 options; if so, list options.

WWW: Post the 1 selected design on your web site:
image, description, whys

SKETCHES/
IMAGES: - clear
- neat
- large enough to be legible

Computer drawn images are optional.
Hand drawn sketches are acceptable if in ink (see me).

2.5 Presentations

Presentations are a very important part of Design Project.
Students will give 3 presentations:

- a short 3 minutes in-class introduction to classmates early in the fall term,

- an end of fall term presentation in December to faculty, classmates and guests,

- an end of year final presentation in April to faculty, classmates and guests.

Students must complete the Dec. Presentation to pass Design Project I.
Students must complete the Final Presentation to pass Design Project II.

PRESENTATION ATTENDANCE

Please note: ALL STUDENTS ARE REQUIRED TO ATTEND ALL PRESENTATIONS**.** Attendance will be monitored, and those who miss a presentation will have points deducted from their final presentation mark.

MISSED PRESENTATIONS

If any student fails to present due to actions on their part (e.g. absence, team's equipment failure, etc.) that will be the student's responsibility and may be grounds for failure. Such a decision would be made by the DP Coordinator and/or Department Head.

BACKUP PRESENTATIONS

If teams are unable to present due to Dalhousie technical problems (e.g. Dalhousie power failure, fire alarm, or equipment failure, etc.) then all postponed presentations will be given on the backup dates listed in the handbook. All teams would be required to attend the backup presentations, not just the teams with postponed presentations. While all team members would be encouraged to attend any backup presentations, a minimum of 2 persons per team for all teams would be acceptable. Any decision to have backup presentations would be made by the DP Coordinator and/or Department Head and an announcement would be made to the students and faculty.

CANCELED PRESENTATIONS

Under extraordinary circumstances where most or all teams are unable to present (e.g. university shutdown) the presentations and Top 5 voting will be canceled, and teams will be marked on the remainder of the marks, prorated to 100%.
Thus students would be rated out of 80% in fall, and rated out of 75% in winter term. Any decision to cancel presentations would be made by the DP Coordinator and Department Head and an announcement would be made to the students and faculty.

2.5.1 Mandatory presentations

October 3 Minute intros
(Due date: see 1.4 Weekly Schedule)

After Design Requirements are submitted, each team will be asked to introduce its project to the class.

All team members come to the front of the class. One person from the team introduces all members (including self), then one of the team members stands up and gives:

Team number

Team members

Project Title

Supervisor

Client

Another member(s) give a brief description of their project goals. We want to know what is it you are proposing to build and what will it do. At this stage we are not interested in how it will look and how you are going to build it.

You should use Power Point. Bring it to the TA one day before the presentation for uploading on the Departmental computer. Limit your presentation to a maximum of 5 slides.

December presentation guidelines

Intro - provide some background, clearly define the problem and the steps

Body - insert your work here

Summary - discussion, conclusions, recommendations

Use roughly 1 slide per minute

An overhead projector and Departmental PC will be provided,
TEST your presentation at least 1 day in advance
At the presentations, bring a memory stick with a backup.

USE BIG TYPE - at least 24 pnt or 1/3 ": At Least This Big
Number your pages
Clearly LABEL your graphs and figures

All outside images/photos MUST be referenced/cited
Minimize the clutter in your graphs and figures, LESS IS MORE
Face the audience and speak CLEARLY and LOUDLY
DO NOT READ your slides – Write down what you intend to say and read it before the presentation as many times as necessary to memorize it.
Use concise form on screen, give detail verbally
PRACTICE , PRACTICE , PRACTICE
    at least twice before each talk - at least once with an audience
Use a pointer
If you use a slide twice, make 2 copies, don't hunt for it
Every time you start/end a section, tell the audience
    (one way is to use copies of your intro slide as section dividers)
Number your pages & remember the order of your slides,
    during the question period, you will have to be able to find a specific page

Movies: Movies are prone to problems. Before the presentation make sure it works on the departmental presentations computer
Be careful of how you link movies in PowerPoint (try pack-and-go option).
Max total movie time = 1 minute.

Bring props Max size: 1 person can safely carry
(also have blow-up photos so audience can see it!)

This is a technical presentation: it should include design calculations.

Do NOT fill your presentation with excessive equations or derivations,
but your presentation should be more than just pretty pictures.
Show your Engineering work.
Show Engineering Analysis & Predictions, not just trial & error.

Format and schedule for the December presentations.

Note: Venue, date and times will be confirmed during the week preceding the presentations.

DATE : December
TIME : 13:00 h
LOCATION: Architecture Auditorium H19

BACKUP DATE:

CHAIRPERSONS:

1:00 - 3 pm Chair = Jane Doe
3:00 - 6 pm Chair = John Smith

1. All students are to be present for the duration of ALL presentations.

2. The department will provide a laptop and an LCD overhead projector.
   Teams with special requirements for the presentation must first discuss them with The TA. Teams who wish to use their own equipment need prior approval and do so at their own risk.
   For all teams, check your presentations on the dept. laptop ***beforehand*.**

3. Presentations will commence at **25**minute intervals.
   Presentation length is **20** minutes, followed by a **4** minute question period.
   The session chairperson will enforce time limits rigorously.
   Note: The presentation duration will be confirmed approximately one week prior to the final presentation.

4. Each team introduces itself and names the team's client and supervisor.
   Each team member shares the presentation time equally.

5. The presentations will begin at ~1 pm and end in the afternoon.
   There will be a food break midway through.

6. Suggested dress of the presenters: business.

7. The presentations are intended to be professional and technical.
   A few humorous comments are ok, but don't over do it (no running gags).

8. Musical soundtracks are not permitted (if you need audio, see the TA).

9. Open Audience (including clients, family and friends if you wish)

DEC. PRESENTATION SCHEDULE

Architecture Auditorium H19

DRAFT SAMPLE

Friday Dec. 4, 2009 (date to be confirmed)

Time	Team	Project	Supervisor
1:00	1:	All Terrain Wheel Chair	Georgiades
1:20	2:	EWB Water Pump	Kalamkarov
1:40	3:	Wave Power	Bauer
2:00	4:	Flying Wind Turbine	Retallack
2:20	5:	Sound Sculpture	Kujath
2:40	6:	I.V.T. (Infinitely Variable Trans)	Warkentin
~3:00		**Food Break**	
3:20	7:	ROV for Landmine Detection	Pan
3:40	8:	Wheel Dynamometer	Militzer
4:00	9:	FSAE Variable Air Intake System	Militzer
4:20	10:	Grinding Coolant Delivery System	Allen
4:40	11:	Human Powered Water Still	Wilkie

DEC. PRESENTATION PRACTICE PC

We will set up a PC with projector in the Measurements Lab
Nov. 29 & Nov 30., ~1/2 day - exact hours TBA. ?

The door will be locked and a key is required.
The projector may be reserved for 1/2 hour slots, through the TA.

DEC. PRESENTATION FILES

Please put your presentation files on the Design Studio PC in the desktop folder called "DP Dec. Presentations".
There is a sub folder for each team.
Max. size ~100 Mb per team.

You must have your presentation loaded on this computer on the day preceding the presentation during work hours.

If you use your own PC, you do so at _your_ own risk.

If you need any other equipment such as a VCR/DVD or an overhead projector please see the TA on the day before the presentation to make arrangements.

If you require the use of video editing software (Studio 8) see the TA

Video and photo cameras will be available for short term loans only this week as the demand for them will be fairly high.

FINAL PRESENTATIONS (April 2010)

Due date: see 1.4 Weekly schedule

DATES:
TIME : 1-6 PM
LOCATION: Architecture Auditorium H19

BACKUP DATE: Friday April 8, 2013

CHAIRPERSONS :

1st Day	Jane Doe	~1-6 pm ?
2nd Day	John Smith	~1-6 pm?

1. All students are to be present for the duration of ALL presentations.

2. The department will provide a laptop and an LCD overhead projector.
   Teams with special requirements for the presentation must first discuss them with The TA. Teams who wish to use their own equipment need prior approval and do so at their own risk.
   For all teams, check your presentations on the dept. laptop ***beforehand***.

3. Presentations will commence at **30** minute intervals.(to be confirmed)
   Presentation length is **22** minutes, followed by a **6** minute question period.
   The session chairperson will enforce time limits rigorously.
   Note: The presentation duration will be confirmed approximately one week prior to the final presentation.

4. Each team introduces itself and names the team's client and supervisor.
   Each team member shares the presentation time equally.

5. The presentations will begin at ~1 pm and end in the afternoon.
   There will be a food break midway through.

6. Suggested dress of the presenters: business.

7. The presentations are intended to be professional and technical.
   A few humorous comments are ok, but don't over do it (no running gags).

8. Musical soundtracks are not permitted (if you need audio, see the TA).

9. If you have a LARGE device or plan to do an OUTDOOR demonstration, please inform me, the TA and the session chairs.
   You may want to have your question period outside.

10. Open Audience (including clients)

FINAL PRESENTATION GUIDELINES

You will need 1-2 weeks to test your device and 1 week to prepare the presentation.
Time is running out ...

- This is a technical presentation: it should include design calculations.
  Do NOT fill your presentation with excessive equations or derivations,
  but your presentation should be more than just pretty pictures / movies.

- Test your PowerPoint Movies ***before*** the presentations.
  Do not over do it on the length of movies, keep them short and to the point.
  Max movie length = 1 minute, max total movie time = 3 minutes.
  Teams who wish to use their own equipment need prior approval
  and do so at their own risk.

FINAL PRESENTATION SCHEDULE

Architecture Auditorium H19

DRAFT SAMPLE

Apr 8, 2010

Time	Team	Project	Supervisor
8:30	13:	Femur Support System	Allen
9:00	12:	Thermo-electric cooling	Basu
9:30	11:	Stair-climber ROV	Georgiades
10:00	10:	Magnetic Wall Climber ROV	Kalamkarov
~ 10:30		**Food Break**	
11:00	9:	Super-mileage B: Engine	Koksal
11:30	8:	Robotic Landmine Detector	Wilkie

Apr 8, 2010

Time	Team	Project	Supervisor
1:30	7:	I.V.T. (Infinitely Variable Trans)	Warkentin
2:00	1:	Truck Crane	Georgiades / Pan
2:30	5:	Pipe-Robot	Bauer
3:00	4:	Mechanical Golfer	Retallack
~ 3:30		**Food Break**	
4:00	3:	Super-mileage A: Chassis	Ugursal
4:30	6:	Human Powered Hydrofoil	Chuang
5:00	2:	Vertical Axis Wind Turbine	Koksal

FINAL PRACTICE PC

We will set up a PC with projector in the Measurements Lab three days in advance of the final presentation. The exact hours TBA.

The door will be locked and a key is required.
The projector may be reserved for 1/2 hour slots, through the TA or Peter Jones.

FINAL PRESENTATION FILES

Please put your presentation files on the Design Studio PC
in the desktop folder called "DP Apr. Presentations".
There is a sub folder for each team.
Max. size ~100 Mb per team.

You must have your presentation loaded on this computer by the end of the work day preceding the presentation date
Bring a memory stick to transfer your ppt to the presentation PC.
If you use your own PC, you do so at _your_ own risk.

If you need any other equipment such as a DVD/VCR or an
overhead projector please see Peter Jones as soon as possible.

If you require the use of video editing software (Studio 8) see Peter Jones or the TA.

The cameras will be available for short term loans only this
week as the demand for them will be fairly high.

2.5 Design notebooks

It is an important habit for any professional to record his daily activities. For most students the Design Project course offers the first opportunity to acquire a design note book (also called lab book, or a log book) and understand its purpose and how to keep it up to date. For professional engineers a log book not only serves to record their work, but also to limit their liability. By noting who said what and who did what, the student can always go back and prove what he did and what he did not do. Every student is required to keep an INDIVIDUAL design notebook or log/lab book. The log book must be hardcover (not wire wound) and signed with contact info. The book should have large pages; 8 1/2" x 11" is preferable. Students are encouraged to personalize it so that it is easily identifiable (e.g. logo/stickers), remember to put your e-mail address and telephone on it, so that it can be easily returned if you lose it. The log book should begin with a Table of Contents, by leaving a few empty pages in the beginning the table of contents can be updated as the work progresses. All pages should be numbered **in ink**. All entries should be dated and each new date should begin a new page. The right side (back of the pages) should be used for design work, the left side for rough calculations and notes. No loose material can be part of the book, however figures and graphs as well as e-mail correspondence, supplier quotes can be glued or stapled into the lab book. The book should tell a story, thus everything to do with the project should be recorded in the book. This way the book becomes a repository of ideas and a reference for further work. The lab book is carefully evaluated by the supervisor, since it serves to tell who did what for the project and quality of work produced by each member of the group. In the evaluation things considered include:

- name and contact information (very important to identify the book and also allow it to be returned in case of loss),
- completeness,
- table of contents,
- numbered pages,
- is it neat and legible,
- does it have loose sheets?
- does it have figures and diagrams and are they clear?
- is the technical content adequate?
- is it complete? Does it contain all relevant information?

Here is a summary of the requirement for the design notebook:

- Every student is required to keep an INDIVIDUAL design notebook or log/lab book.
- The log book should be hardcover (not wire wound) and signed with contact info, including e-mail address.
- Purchase the largest suitable lab books you can find, 8 1/2" x 11" is preferable.
- Make your lab book easily identifiable (e.g. logo/stickers).
- The log book should begin with a Table of Contents.
- Leave a few blank pages at the beginning for the table of contents. Fill in the table of contents as you use the book.
- Number all the pages.
- Each new entry should be dated, and each new date should begin on a new page.
- The right side should be used for design work, the left side for rough calculations.
- Figures and graphs should be glued or stapled into the lab book.**(no loose sheets!)**
- Emails are very convenient but also less concrete and less likely to be saved.
- Print out and glue important emails into your lab book, do not leave them loose.
- Write it down.
- Whenever you do anything, it should go in the book
- The lab book is a legal document; it is what proves that YOU did the work.
- The lab book is important since it will remain long after you will have left,
- It should be the first place to look for research information.
- It is a good habit to get into; having all the information in one place is the key.
- The lab book should be an accurate record of ALL your work.

Lab Book Additional requirements (new for 2011):

- Students should have the book with them all the time and the lab book should be kept up to date ALL the time. There will be random checks during the term.

Students randomly chosen will receive an e-mail requiring them to bring to the see the Coordinator with their lab book within a short period of time. (usually less than an hour) for a verification. Students that fail the verification will have marks taken off the Lab Book components, the penalty can reach as much as 15% of the final mark.

- Each group will have the last 30 pages of one of their lab books used for recording the agendas of their weekly meetings. Each agenda should occupy one page and should be signed each week after the meeting by the group supervisor. This will be verified at random times by the coordinator during the term. Failure to fulfill this requirement will affect the Lab Book mark component of all members of the group.

2.6 Build vs. No-build projects

Most design teams will construct a physical device of some sort. However some projects do not easily lend themselves to physical construction and some projects may be beyond the departmental resources or time scope of this course. In such cases a limited number of teams may request a no-build or design-only project.

All of the following must be met:

1. All Teams must declare from the beginning that they are doing a build or no-build projects.

2. Teams planning to do a no-build, design-only project must submit with their design proposal an additional 1 page memo clearly outlining:
   a. why a no-build, design-only is required
   b. precisely what will be delivered to the client
   c. detailed method of testing/validation

3. All parties involved must agree in writing that it is a no-build, design-only project: the team, the client, the supervisor, and the co-ordinator

4. Build Teams who wish change from to a no-build, design-only project midway through the course must see the coordinator.

All teams, build or no-build must still:

- Sign the safety form
- Submit a Build/Design report (report status and show design is practical)
- Pass Inspection (show that it works)
- Submit Test report (prove it works well)

The difficulty lies in fairly comparing build and no-build projects.
All projects will be evaluated by the same criteria.

With built devices it is easy to evaluate the performance. With no-build, design-only projects, that can be more difficult. For this reason no-build teams will be held to higher standard of specificity and precision in terms of the design. For Design Requirements, you must precisely state what you will do. For Inspection, you must state in September what you will demonstrate in March. For the Testing other method besides physical testing must be used, e.g., simulations, etc. The testing must prove that your design would work and it should be numerical/quantitative rather than subjective/qualitative.

2.7 Build/design reports

Due date: see 1.4 Weekly schedule

The purpose of this course is to DESIGN and for <u>most teams</u> to BUILD a device.

All teams must submit Build/Design Reports to be evaluated by the coordinator and the technicians, even if you are not asking the dept. to build anything. The build report must include a complete budget.

2.7.1 Meeting with the technicians

Before submitting the Build/Design report each team must meet with our technicians. At the beginning of the term a meeting schedule will be published. Each technician would have received a complete set of drawings prior to the meeting. During this meeting the technicians will discuss with the team the drawings and the fabrication process. They will recommend changes and corrections. The coordinator will keep a record of the requirements to help check the drawing once they are submitted with the Build/Design reports.

2.7.2 Gantt Chart

As part of your Build Report you need to include a Gantt chart. You can create your own with, for example, an Excel spreadsheet, or any suitable software. We recommend that you learn to use Microsoft Project, which a valuable tool to learn and furthermore it is widely accepted by the engineering community.

HOW TO GET A COPY OF MS PROJECT ?
Dalhousie University has an agreement with MS called MSDNAA to allow our students free access to some of their software as long as they are registered in our program.

The software that is available can be found here:
http://msdn01.e-academy.com/elms/Storefront/Storefront.aspx?campus=039061&np1=112

The site is a little weird, since it will display only a limited part of the available software.

How to get a copy of MS Project?

Send an e-mail to Peter Jones (peter.jones@dal.ca). he will create a user list and submit it to the ELMS system and it will send out an email to each person on the list. The email will contain their username and password for accessing the download site. You will then be able to log in, download whatever software you want and obtain your own personal CD key for the software. The software files are ISO images that you can use to burn your own CD or DVDs.

2.7.3 Brainstorming

Once you have a team and have selected your project you will have about four weeks for brainstorming. The idea here is to explore the different possible solutions to your problem. This is an important step when you consider that by not choosing the best solution to the problem, you will have a device that under performs and probably will be more difficult to build and test. So spending the time to the brainstorming properly will generate rewards in the final result. There are several web sites on the Internet that tell how to carry out the brainstorming exercise. Here are a few suggestions:

1. http://www.isixsigma.com/library/content/t000527.asp
2. http://www.brainstorming.co.uk/tutorials/preparingforbrainstorming.html
3. http://www.wilywalnut.com/brainstorm-rules.html
4. http://www.ideo.com/about/methods/info.asp?x=2
5. http://www.slyasafox.com/book/book_24.html

2.7.4 Budget

Each team must prepare a Project Budget in consultation with its supervisor, client and our technical staff.

A budget is due as part of the Build Reports.

Expenses: list the required:

- supplies,
- departmental technician time,
- outside technician time,
- calling cards / fax costs,
- other expenses

Income: include expected contributions from all sources:

- clients,
- sponsors,
- team,
- requested support from the Department,
- other sources

The Budget has to be submitted to your supervisor and signed by your supervisor. Please discuss your budget with your supervisor ASAP.

Please remember that it is a privilege to be able to use the departmental resources, and your team has to earn it. Not all projects get support.

I expect to see a **1 to 2 page document** titled Budget, with your title, team number, team names, date, client and supervisor's name with supervisor's signature.

The budget should be to the point: bullet form, no paragraphs of text.

A departmental DP account will be set up to manage project funds.
Based on the build reports and submitted budgets, each team will be assigned a budget amount. Last year the average was ~$1,700 per team, some teams got more, some less.
Teams with outside clients must also submit a budget which will have to be approved by the client, who is ultimately is responsible for providing the funding.

Teams that are no-build, design only will not receive departmental funding.

Typically the ME departments provides some funding to all un-funded Build teams,
if a team has a sponsor the department typically provides little or no funding.
If a team was ill prepared to build, the department provides less funding.

What to do after you receive the results of the budget allocations

1. 1 person from each team _must_ see the dept. admin. secretary ASAP for procedure for spending money from your budget, otherwise no money will be authorized.
>> Bring a 1 page Budget. <<

2. If you have a client or sponsor, we would prefer to administer all the team funds from the ME dept. DP account. See the dept. administrative secretary ASAP about how the money should get to the department.

3. ME dept. money comes with strings, if we give money we often keep the equipment. If you take the money, you accept the conditions.

4. Remember to submit a **separate** reimbursement form for **$200 1st term mock-up supplies**:

We will accept Receipts dated prior to Dec 31st, calling cards and Fax costs are re-reimbursable, we will not re-reimburse lab book costs or printing costs.

Build/Design Reports determine:

1) Team progress
2) Is the design practical?
3) What work (if any) the department will allot each project.
   Departmental fabrication of any project is a privilege which must be earned.
4) Are the drawing correct and complete?

The Dept. Build & Design Report must answer these questions:

- Is the team designing and building or just designing?
- Can the dept. technicians clearly understand what to design/build?
- Is the solution practical? Is it build-able?
- How far along is the team?
- Are the remaining unknowns clearly listed and acceptable?
- Who builds what?

1st Term: Nov 19, 2012 5 copies (check 1.4 Weekly Schedule)

Initial Engineering Drawings: major parts, rough dimensions, details optional
What (if anything) does the team want the dept. to build?
Mock-up / Scale Model / Test Results (Optional)
Budget: major parts, ~$
Gantt Chart for winter term
List of "To Be Determined"s

2nd Term: Jan 18, 2013 2 copies (check 1.4 Weekly Schedule)

Engineering Drawings: "all" departmental parts, "final" dimensions
Acceptable list of remaining unknowns
Safety Issues
Construction Results (Optional)
Division of Labour: who builds what – technicians, students, others
Revised Budget: parts, $
Revised Gantt Chart for winter term

The Build/Design Reports ***should not include*** *large quantities of text or reports: the Reports should be self-explanatory, clear and concise.*

Drawings from the 2nd Term Dept. Build/Design Reports are final.
The technicians will keep them and no 'new' fabrication will be accepted.

Departmental Resources

Departmental resources are limited; we will not be able to build all devices.
Some teams will get most of the resources they request, some teams may get none.

Teams who prepare well and present good clear build reports will be given priority. Teams who request unreasonably large amounts of money and or technician time for their project will jeopardize their chances of being funded. This also applies to those teams who request unreasonably short technician time for a given job.

2.8 Term reports

Due date: Check 1.4 Weekly Schedule

The Term Report should be handed in by the deadline to the department (not the supervisor). A cover letter or memorandum of transmittal should be attached.

Lab books are due with the report (to the department, not the supervisor). Lab books submitted late will not be considered.

You have already done a lot of work for the assignments throughout the term. Use that as a framework / starting point for your report.

TEAMS should submit a hard-copy AND a CD-ROM soft-copy of the report .

FORMAT:

- Title Page: course, project title, team #, member names, supervisor, client, date

- Summary/Abstract (200 to 500 words)

- Table of Contents

- List of Tables

- List of Figures

- Main Body
  - -Introduction: clearly describe the project and its purpose
  - -Design Requirements: specifically list what was agreed / deliverables
  - -The report should demonstrate/explain the design process
  - -"The Design"
  - -Design drawings/diagrams/illustrations are a major part of a design report
  - -Status
  - -Cost Analysis: budget, components, fabrication etc.

- Conclusions
  - Have the requirements been met? Will / Did it work?
  - Future work / Timeline

- Appendices

Drawings: Engineering drawings must be machine drawn.

Length: Teams should discuss length with their project supervisor.

Organization:
Organize the report hierarchically, with different levels.
Start with the big picture, then zoom in on detail.
Make a skeleton or table of contents of the report first, then fill it in.
The numbering, size and indentation of the section headings should indicate their level of importance: your table of contents should visually express what you want to say.
In the main body, start each new section on a new page.

Paragraphs & sentences:
1 paragraph = 1 explanation or 1 argument.
1 sentence = 1 thought.
Finish the thought before moving on,
don't go back and forth: e.g. Idea A, Idea B, Idea A

Figures and Tables:
Figures, tables and photographs must be numbered, captioned, and referred to in the text.
All figures from external sources **MUST** be properly cited.
Figures must be large enough to be easily read.
Figures must be uncluttered and clear.
Graph axes must be labeled with units.
Oversize drawings or diagrams must be folded so that they fit within the report dimensions.

References:
References must be complete and must be referenced in the text; they must give sufficient information to enable any person reading the report to find the references quickly and easily. Uncorroborated information from WWW sources is **unacceptable as sole-source** references. Photos from outside sources **must** be referenced.

Appendices:
Appendices are normally included to provide detailed information such as calculations or mathematics which would detract from the readability of the main body of the text.

Numbering: The main body is numbered consecutively in Arabic numerals (1,2,3 …). Material preceding the first page of the main body is numbered in small Roman numerals (i,ii,…). The title page is considered to be page i but is not so indicated.

Text size: The text of the report should be double spaced with single space for footnotes or lengthy quotations. Minimum font size is 12 pnt, use the same font throughout.

Margins: There should be a margin of 3.8 cm (1.5 in.) to allow for binding on the left-hand side of the paper; 3 cm (1 in.) at the top and bottom.

2.9 Device design/testing

Due date: Check 1.4 Weekly Schedule

What did you promise in September? **What did you deliver in April?**

1. Each team must carry out tests to evaluate the performance of their device/design. Tests must be carried out in a safe manner. Teams must demonstrate repeatability & reliability: doing it once is not enough.

2. The final report submitted to the supervisor must include a testing section. This should be a significant portion of the total report (not just a few pages).

- Written description of testing/validation methods
- Pictures/diagrams of testing
- List of tests performed, List of tests not done
- Repeatability & Reliability: How many successful runs? / How long a run?
- If applicable, graphs
- Comparison Table:

	Design Requ. (Sept.)	Actual Performance (April)
parameter	#	#
parameter	…	…

Note:
In past years some teams have exaggerated the success with which they met their objectives or glossed over deficiencies, or highlighted minor successes while downplaying major problems. Evaluations of a team's performance that are not accurate, not balanced, unrealistic, or not credible will result in a decreased presentation mark.

- Discussion of results: **Did it work? Why? Why not? How would you fix it?**

3. **A separate shorter written test summary is to be submitted to the DP co-ordinator (due same day as final report). Format: 3 pages maximum.**

Page 1: Concise written summary of testing methods,
List of tests done, list of tests not done,
Brief discussion of results,
Repeatability & Reliability, How many runs? / How long a run?

Page 2: 2 pictures, diagrams or graphs

Page 3- Comparison Table:

	Design Requ. (Sept.)	Actual Performance (April)
parameter	#	#
parameter	…	…

Evaluations of a team's performance that are not accurate, not balanced, unrealistic, or not credible will result in a decreased test report mark.

4. The final oral presentation must include 5-10 minutes of test results. Show <u>multiple</u> test runs/results, e.g. short videos, graphs, etc. Discuss Repeatability & Reliability

2.10 Inspection

(Due date: Check 1.4 Weekly Schedule)

1. Each team must arrange an inspection of their device/design by the co-ordinator.

Inspections are due approximately two weeks before the final presentation.

It is the team's responsibility to arrange an inspection *before* Mar 16, 2012.

Inspections can be requested anytime in the 2nd term.
If you have a working device/design earlier in the term, arrange for an earlier inspection, do not wait until the last minute.

In addition to the DP co-ordinator, at least 2 team members must be present, the supervisor may also attend, but is not required to attend.

Video-taped inspections may be arranged with prior approval of the coordinator. This would typically be limited to devices tested off-campus.

2. Teams must demonstrate a working device/design at inspection.

Build or non-build, physical device or solely a design, you must have something that does what you promised in September in the Design Requirements.
It does not have to be complete, but should be able to perform its core functions.

3. Inspected Devices must be safe to operate.

No testing may be done until a device is made safe.
Unsafe devices will have to be modified and re-inspected

LATE INSPECTIONS:

If teams do not have a working device inspected by the due date, points will be removed from their total, to a maximum of -5%.

NO INSPECTION:

Teams that do not pass inspection by the end of the term cannot submit test results.

2.11 Team participation memo

Due date: See 1.4 Weekly Schedule

At the end of each term, when submitting individual lab books, each student must submit a **1 page memo** outlining work or share of work done.

The memo should be short and concise (bullet form).

The first line of the memo should be your estimate of your percent of the work:
e.g. if there were 4 team members, did you do 25%?, or did you do 30%?, 20%?, etc.
Underline & bold your % estimate.

Also list your estimate of *your teammate's* percentages of the work.

Supervisors may also request face-face meetings with all students.

CHAPTER 3: RULES AND REGULATIONS

Rules and regulations are an integral part of the design project. They are created to guide your work and ensure your safety and fairness in shearing of our limited resources. Please make sure you read and follow all rules and regulations.

3.1 Working rules

1. Scheduled design project classes are compulsory. The schedule provides for three lectures per week. This, however, usually exceeds our requirements. Thus you will be advised via e-mail, with adequate advance, of when a lecture will be held. Otherwise, it is safe to assume that there will be no classes. If there are doubts or questions that warrant a lecture, students can initiate the process by sending the coordinator an e-mail.

2. Weekly design project meetings with the supervisor are compulsory.

3. Design teams has four students; changes to this number require departmental approval.

4. Design projects may be selected from the suggestions prepared by the department. These are proposed either by faculty, by outside clients or by the students themselves. All projects MUST be supervised by a full time ME faculty. All projects must be approved by the department.

5. Students are expected to start work at the earliest date possible. Students who have not made an approved choice by the cutoff date will be assigned a group and/or project by the Design Project coordinator.

6. All students must keep a bound Design Lab Book, and carry it all the time when on campus.

7. Before the design activities start, each team prepares a Design Requirement Memo. The requirements must be approved and signed by the Team, Client and Supervisor.

8. Formal written communication with the coordinator, supervisor or client, are to be done through memos.

9. Each team must maintain a web page outlining the project.

10. Teams must earn the privilege of having their designs fabricated.

11. A typed formal Report is required at the end of each term. The Report and the Design Lab Books are to be submitted to the department (not the supervisor).

12. Each student must carry his/her share of the team load.

3.2 Meetings

Weekly meetings with supervisor are mandatory. Students must also meet weekly as a team. If you have not done so, inform the coordinator of both meeting times.

How to run a meeting:

- Keep a record
- Start each new meeting with review of assigned tasks and report of progress.
- Who was supposed to do what?
- Was the assigned work done? Why / why not?
- List what has to be done.
- Deadlines?
- Prioritize
- Leave each meeting with assigned tasks for each team member.
- At the beginning of the next meeting go through the assigned tasks to see who did and didn't complete their assigned tasks.

Note: Weekly meeting agendas must be registered in one of the team's log books and signed by the supervisor.

3.3 Team participation

Team Participation is worth 5% of the term marks. Each student will be evaluated by the supervisor and co-ordinator.

The following factors will be evaluated:

- Participation in weekly meetings
- Attendance of lectures
- Presentations
- Share of workload:
- Design
- CAD drawings
- Simulations
- Report writing
- Construction
- Web page
- Testing
- Fund raising

Note:

If you miss a required task, or fail to do your share of a required task,

you will lose points on that task AND lose points on team participation.

3.4 Safety rules

Students must follow all safety rules in order to pass.

Failure to follow safety regulations may result in a grade of F.

1. Report all equipment problems.
2. Eye protection, and hand protection must be worn when using tools.
3. Never work alone.
4. Keep you work space clean and organized. Put tool back in their place after you used them.
5. Put away all materials and tools after you finished the work for the day.
6. Teams found in violation of the above rules will have their privileges suspended or totally eliminated.

In case of emergency, contact:

Shop Supervisor			
Julio Militzer	C364	x 3947	e-mail:jmilitze@dal.ca
Peter Jones	C253	x 3912	e-mail:peter.jones@dal.ca
Dal Security		x 4109	

3.4.1 Fabrication safety rules

1. AUTHORIZED USERS ONLY - Users must be authorized by department technicians before work begins.

2. All team members must take a safety tour organized by our technicians to become acquainted with out shops, tools and machines. Students that have taken the tour will not be allowed to use the shops. Students will be given notice when to go and register for the tour.

3. Proper safety eye wear, footwear & clothing must be worn.

4. Users with long hair must secure it properly.

5. No student fabrication after hours without technician authorization.

6. No power tools after hours without technician authorization.

7. Each team will receive a basic tool box. The tool boxes will distributed by one of our technicians.

8. Machine shop tools cannot be borrowed.

9. No personal tools without technician authorization.

10. Paints and other volatiles may only be used in vented welding shop.

11. All work with composites (carbon fiber, fiberglass, graphite, Kevlar etc.) must have prior approval by the department.

12. Caution must be exercised with all rotating machinery.

13. Caution must be exercised with heated/welded components (burn risk).

14. Never work alone.

3.4.2 Testing safety rules

During the second semester, in Mech 4020, each team will be required to test their device. Most devices involve moving parts and some involve rotating parts. All these pose danger to observers. Before doing any testing please follow these rules:

1. Develop a written test procedure, including all steps in operating your device from start up to shut down.

2. In your procedure you should include location within our facilities and proper distance of observers.

3. You should also specify all safety gear to be worn by the team and technicians during the test (goggles, gloves etc).

4. Have your supervisor look at your device and procedure to obtain his approval. If your supervisor is not available, or if you prefer, I can do the inspection.

5. Have one of our technicians inspect your device and review the procedure.

6. Only after both your supervisor and a technician have approved your device and test procedure, you are allowed to do the test.

3.4.3 Vehicle testing safety rules

The following rules are specifically applied to the testing of vehicles, which are normally conducted out of doors and not on Dalhousie property. Follow the rules in section 3.42 and in addition:

1. NO project vehicle may be test driven UNTIL the supervisor formally grants permission to begin.

2. Supervisor or technician MUST be present for ALL vehicle test driving.

3. Vehicles MUST be safety inspected prior to each test drive.

4. Protective Equipment MUST be worn, including as a minimum:
   - helmet
   - eye protection
   - gloves
   - long sleeve shirt, pants & proper footwear

5. Team members only, no outside parties may test drive vehicles.

6. No parking lot testing where people or other vehicles are present.

7. Report ALL accidents.

Note: In recent years we have able to use part of Pier 23 parking lot. Before using it you must obtain a permission, which includes a responsibility waiver to be signed by the team members and the supervisor.

Questions: Where will you do the testing?
Will weather effect/ delay your testing?

In case of emergency, contact:

Your Team Supervisor AND

Julio Militzer	C364	x 3947	e-mail:jmilitze@dal.ca
Peter Jones	C253	x 3912	e-mail peter.jones@dal.ca

3.4.4 Safety rules agreement

Read the safety rules below, print a copy, have it signed by all team members and give the signed form to our secretary. You will be advised when the signed agreement is required.

Failure to follow safety regulations may result in a grade of F.

1. AUTHORIZED USERS ONLY- Users must be authorized by department technicians before work begins.
2. Users must learn safety procedures and location of safety equipment.
3. Never work alone.
4. Users must report ALL accidents.
5. Users must report all equipment problems.
6. Eye protection must be worn by all students at all times when using tools. Proper safety equipment, footwear & clothing must be worn as needed.
7. Users with long hair must secure it properly.
8. No student fabrication after hours without technician authorization.
9. No power tools after hours without technician authorization.
10. No personal tools without technician authorization.
11. Chemicals, paints and other volatiles must be authorized by department technicians, must have WHMIS, and may only be used in vented welding shop.
12. Users must clean up their workspace daily and properly store tools and supplies.

13. Vehicles:
    a) NO project vehicle may be test driven UNTIL the supervisor formally grants permission to begin.
    b) Supervisor or technician MUST be present for ALL vehicle test driving.
    c) Vehicles MUST be safety inspected prior to each test drive.
    d) Protective Equipment MUST be worn, including as a minimum: helmet, eye protection, gloves, long sleeve shirt, pants & proper footwear.
    e) Team members only, no outside parties may test drive vehicles.
    f) No parking lot testing where people or other vehicles are present.

We have read the above safety rules, understand the rules, and agree to follow all the safety rules.

Team Member _____ Date:_____
Team Member _____ Date:_____
Team Member _____ Date:_____
Team Member _____ Date:_____
Team Member _____ Date:_____
Team Member _____ Date:_____

Supervisor _____ Date:_____

3.4.5 Safety in winter term

Safety is #1 Priority

Build is #2 Priority

Before starting anything please answer the following questions:

1. Have I reviewed what I am going to do and all the steps involved?
2. Have I taken all necessary precautions?
3. Can I do it safely?

If you are not sure you can do the task safely, ask one of our technicians to help you. And remember, **if it cannot be done safely, you should not do it.**

Let me remind you of the importance of following the safety procedures.
Teams must **re-sign** the Safety form for this term.

Please review the safety rules handed out earlier in the term. If you have any questions or concerns, see your supervisor, the technicians or the co-coordinator (me).

You should be looking out for the safety all your classmates.
If you see something you think is unsafe try to solve it _locally_ first:

- ask the student and discuss it with him/her,
- if necessary ask the technicians,
- and if necessary ask me.

Don't go overboard, be reasonable and use your judgment.
It is ok to have few false alarms.

If a safety infraction occurs, a team may receive a warning, or the entire team may be suspended from construction for a day, for a week, or indefinitely.

If there is a major accident, we may have to suspend _all_ projects temporarily.
So it is in all our interest for all projects to work safely.

Safety Eye wear is provided free to each team, if you require more ask Peter Jones.
If you require additional safety equipment, ask Peter Jones or the co-coordinator.

Safety rep: 1 per team, regular meetings with co-coordinator

Safety site www.dal.ca/safety

3.5 Reimbursement procedures

ITEM PAID FOR BY STUDENT:

1. Fill out reimbursement form.
2. Sign form, and have supervisor and DP co-ordinator sign.
3. Purchase item(s)
4. Obtain all receipts for item.
5. Please also obtain receipts for additional items such as courier, brokerage, etc.
6. Attach to form receipts indicating items being claimed.
7. Submit to Administrative Secretary, C360
8. Reimbursement will be in the form of a cheque issued by Dalhousie University.
9. Please allow up to 4-6 weeks to be reimbursed.
10. Email will be sent telling you when your cheque is ready to be picked up.

ITEM NEEDING DEPARTMENT CREDIT CARD PAYMENT (OVER $100 ONLY):

1. Fill out Credit Card Purchase Requisition form and attach any other information.
2. Sign form, and have supervisor and DP co-ordinator sign.
3. Call supplier, order item, and state that the department will be calling with a credit card number. Jot down any order number, etc., to identify order when calling.
4. Submit form to Administrative Secretary, C360
5. Secretary will call supplier with payment (and if needed, shipping) information and will inform student via email that item has been paid for.
6. After item is received/picked up, submit receipt to Secretary. Failure to do so will result in this form of vendor payment being revoked from team.

NOTES:

For US/foreign orders, 10-20% of the total amount will be deducted from your budget for customs/brokerage fees. This amount will be adjusted after the invoice is received.
Teams are not permitted to start a tab at any supplier or vendor.
Teams are not permitted to request an invoice be issued by a supplier or vendor payable by the department or Dalhousie University.

1. All items being shipped and paid for by department credit card must be shipped to department address.
2. Teams are **not** permitted to start a tab at any supplier or vendor.
3. Teams are **not** permitted to request an invoice be issued by a supplier or vender payable by the department or Dalhousie University.
4. All items being shipped and paid for by department credit card must be shipped to department address.

MECH 4010/4020 REIMBURSEMENT FORM

TEAM #:	_____
Team member:	_____
Banner #	**B**_____
Email:	_____@_____
Mailing Address:	_____
	_____
	_____
Total Request	**$**_____
US / Foreign Order	**__NO ___ YES (allow 10-20% custom fees)**
Purpose:	_____
	_____
Member Signature	_____
Supervisor Signature	_____
Coordinator Signature	_____

MECH 4010/4020
CREDIT CARD PURCHASE REQUISITION

3.6 Departmental faxing policy

Students must first speak to the departmental secretary before any faxes are sent or received. The departmental office is sometime quite busy, and your faxes may have to wait. The scheduling will be decided by the departmental secretary.

Fax Service Price List

Sending:	
Local/Toll Free	$0.50 per page
Long Distance	$1.00 per page
Receiving:	
Any	$0.25 per page

CASH only!!

Any unauthorized/unidentified faxes received on the department's fax machine for a student that doesn't meet the above requirements, will be shredded.

NOTE:
Kinko's, corner of Spring Garden Road and Brenton Street, will send faxes for students at a reasonable cost.

3.7 Departmental printing policy

DP students are responsible for printing/copying their own reports.

DP budgets may be used for report printing/copying costs to a max. of $50 / year, with supervisor's prior approval.

NO DP students are permitted in the ME dept. copier/printer room. Period.

PHOTOCOPIES:

Students should not be using ME copiers for DP reports free of charge.

B&W PRINTING:

Students should not be using ME printers for DP reports free of charge.

COLOR:

Color prints in particular are very expensive, but also hard for students to get.
We have traditionally turned a blind eye to 2-3 pages of color max. ,
but _not_ the whole report.

PAMPHLETS:

We have treated pamphlets differently since they are for fund raising, and the ME dept. will continue to print those.

PLOTTER:

The department has a large format plotter in C250. It can print up to 36" wide.

You may wish to use this plotter for drawings, posters etc. that are directly related to your Design Project.

The cost for DP items is $2 / drawing.
The first team drawing is free, see Peter Jones.

If you wish additional drawings:

See Morgyn Macleod, she will debit your team account.
Have your supervisor sign a re-reimbursement form for a $10 plotter print-out card (5 print-outs).
Once you have the $10 plotter credits, see Peter Jones

CHAPTER 4: RESOURCES

The department makes a wide range of resources available to the design project tea. Things like a desk in the design studio, consumable materials, technician time, machining, assembly, computers, printers and so on. These resources must be shared equitably and within our guidelines.

4.1 Design studio

The Design Studio is located in C101 on the ground floor of C building, its main purpose is to provide space for each design group to meet, keep stuff, work on the project and exchange ideas with other students. Few other engineering departments in Canada have this type of space, feel privileged.

4.1.1 House rules

The house rules for the Design Studio were developed by former seniors.
Each senior class can modify the rules.

- Last one out locks the door. Don't leave the door open/unlocked.
- Don't allow strangers to roam around.
- Keep your area neat and tidy at all times.
- Food and drinks are allowed in the room, however dispose of your trash.
- Keep all equipment off the floor, items on the floor will be removed/discarded.
- Do NOT touch other group's projects without permission.
- Respect other people's needs.
- Do not disturb others with loud conversations or music.
  If everyone is OK with it then go ahead.

4.1.2 Tool boxes

Students may sign out toolboxes for their teams. Each toolbox has a 'complete' set of hand tools. Students are responsible for the tools and must pay replacement costs at the end of the year for any missing tools. Please see Albert for more information.

4.1.3 Design studio manager

The Design Studio Manager looks after the studio and reports any problems to the coordinator. The job of Manager involves extra work. We will be looking for volunteers in late September.

4.1.4 Lock combination

Peter Jones will provide the the door lock combination. The combination should be distributed to each team. Do not distribute the combination to non-project persons.

4.1.5 Voice mail

The design studio phone (x6215) has voice mail: Passwd= DALMECH
Do not change this, as all students need access. Please erase messages after receiving them. ALL messages will be erased at the end of each term.

4.1.6 Studio tables

Tables will be assigned by the co-ordinator. Not all teams need a studio table.

4.2 Departmental technicians

Albert Murphy	welding/machine shop	albert.murphy@dal.ca
Angus Macpherson	machine shop	angus.macpherson@dal.ca
Jon MacDonald	electronics	behind Peter Jones office
Peter Jones	dept. engineer	peter.jones@dal.ca
Mark MacDonald	welding, machine shop	mark.macdonald@dal.ca
Robert Warner	CAD/CAM/CAE	robert.warner@dal.ca

Advanced Manufacturing Group:
The AMG also provides CNC machining and specialized CAD/CAM services to design projects on a fee basis.
Contact: Robert Warner

Teams are **strongly encouraged** to meet with all department technicians/engineers.

4.3 What is expected of you during, design, fabrication and assembly.

This is your project.

The technicians will assist you with fabrication, but you have to be prepared to commit time to the construction. The technicians will not build it all for you, you have to participate.

Obviously, there are fabrication steps you won't be able to do, but students are expected to do as much of the construction (e.g. assembly, smaller jobs, etc.) as they are safely qualified to do.

4.4 Student use of departmental shops.

Students with machining experience may request access to departmental equipment. Students must first be by certified by shop supervisors to determine if they are qualified. Students using departmental equipment must read and follow all safety rules.

4.5 Assigned technicians and assigned hours per month.

Each project will be assigned a primary technician(s), and a set number of fabrication hours/month. You cannot save up your time: once a month has past, that time is gone.

Every year, some teams are late with their designs, submitting late and hoping to squeeze in.

ALL Projects are created Equal, no jumping in front of the line.

Non-Mech technicians:

see your primary technician before you go see outside people,
e.g. EE dept. technicians.

4.6 Walk-in day

These are times when technicians, who are not normally supposed to be in, come in to help one or more teams. These are usually necessary during the construction crunch in the second semester. The walk in times will be announced in advance. During the **1st term** there is not crunch and the technicians are generally available most days, check with technicians.

2nd term: The technicians will be available for "small walk-in jobs" at times to be announced. However, you must always see your primary technician first.
Your primary technician must ok your walk-in jobs.

Walk-in is intended for:

1) teams with little/no assigned technician time,
2) teams needing fabrication not done by their primary technician.

this is **not** a free day to increase your tech time.

Regular jobs will NOT be interrupted for walk-ins / last minute jobs.

Walk-in fabrication is completely at the discretion of the technicians, they decide. Drawings may be omitted for small jobs at the discretion of the technicians.

4.7 Engineering drawings.

Requests for MAJOR fabrication must include signed & checked engineering drawings. Technicians will not fabricate major designs without signed Engineering Drawings. At the beginning of the winter term we will organize a meeting between each team and the technicians, to review your final drawings. At that time you, will be give instructions as to what has to be fixed in your drawings and only corrected drawings will be executed by the technicians.

Speak to the technicians first, ask them what their requirements are.

Drawings must be clear & neat
Submit all plans at one time, don't trickle them in
Clearly state tolerances: which parts are critical, which are not.
If the device must fit an existing part, bring that part.

In general, drawings submitted after the deadline will **not** be accepted.
Your submitted drawings are final.

4.8 Modifications and rebuilds

We will build what you ask for. Once you submit a drawing, **that** part will be built, right or wrong.

If there is a mistake in your drawing, we will accurately make the mistake you requested, so check your drawings carefully. One good way is to have one student make the drawing, and another student approve the drawing.

We have a limited supply of technician time and we have to fairly divide it among teams. Re-building your part takes time from other teams. We will not have time to make parts twice.

If you need a small correction, speak to your primary technician.
If it is early enough, you **may** be able to make changes if:

1) the change is time-neutral
2) it only involves a small change

e.g. you may want a hole enlarged or a part cut smaller,
but we won't make a new part with a smaller hole, or rebuild a part slightly longer

Try to design your parts so that, if necessary, small modifications could be made.

The technicians must approve any changes from your final drawings.

4.9 Cad training

Towards the end of September we will provide the schedule of a series CAD drawing lectures. The times will be during our Mech 4010 regular hours. Every team must have at least one member trained in CAD drawing. Lectures are open to all students, space permitting. Every team must have at least one member participate, unless they are granted a dispensation by proving, to the satisfaction of the instructor, that they have the necessary knowledge.

The TA will be responsible for delivering these lectures. More information will be given at the beginning of the fall term.

4.10 Rapid prototyping

The department has acquired in 2008 a rapid prototyping machine. Basically, it is a copier that coverts your 3D cad drawings into a 3D part made out of a special plastic. It is relatively inexpensive and can produce parts as large as 10x10x12 inches. During the month of October we will have a special session with the TA in charge of operating the rapid prototyping machine, during which he will explain the procedure for ordering parts.

4.11 Departmental keys

1. Permission for keys must be endorsed by 3 persons, namely:
   a) supervisor, b) co-coordinator (J.M), and c) lab manager (P. Jones).

2. Approved keys may be obtained from Morgyn at the ME office.

3. Maximum 2 sets of keys per group.

4. $20 refundable deposit per key.
   NOTE: Some rooms will require 2 door keys for access ($40 deposit).

5. Keys must be labeled with group number DP_X .
   Do not put your name or room number on the key label!

6. Any unlabeled keys found/turned in will be confiscated and no deposit refunded.

7. Keys found in a hiding place will be confiscated.

8. Keys are the responsibility of the person to whom it is issued.
   Department retains the right to revoke key privileges at any time.

CHAPTER 5: EVALUATION

Every item from your deliverables list (Chapter 2) is used for evaluating each team and some of the (notebook, presentation and individual participation) will be used to evaluate individuals within each team. Thus, not all members of a team will necessarily receive the same mark. This chapter gives a summary of the forms used for the evaluation. This will serve as a guide for the students to understand what is the relative importance of the deliverables, and for each of them what we are looking for. The evaluations are primarily done by the design project coordinator, with the exception of the two notebooks and the final reports. In addition all faculty will give a ranking of your project. Students also get an opportunity to rank the projects during the final presentations. These evaluations serve to limit the number of teams that can obtain an A+, which is usually reserved to the top teams as judged by professors and students.

5. 1 Design selection evaluation sheet

Note: This form is used by the course coordinator.

Supervisor: _____

Project Name: _____ Team #: _____

Mark:	**10** outstanding	**9** excellent	**8** very good	**7**	**6** good	**5** fair	**4**	**3** poor

Project Summary & Definition	__ very good	__ good	__ fair	__ poor
Presentation/Organization:	__ very good	__ good	__ fair	__ poor
Clarity:	__ very good	__ good	__ fair	__ poor
Grammar / Spelling:		__ good	__ fair	__ poor
Tech. Diagrams:	__ very good	__ good	__ fair	__ poor
Evidence of design process:	__ very good	__ good	__ fair	__ poor
Is the final design clear?	__ very good	__ good	__ fair	__ poor
WWW posting	__ very good	__ good	__ fair	__ poor

SPECIFIC COMMENTS:
Was there anything especially good?, Was there anything missing/wrong?

5.2 Build/design report evaluation

1. RANK TEAMS:

Who do we have confidence in? Who will get it done?
Who did good job?, Who did not?
Is the project challenging?
Who is ahead?, Who is behind?
Reward good preparation.

2. SPECIFICS:

Is this a build or no build project?

Is the problem clearly defined?
What (if anything) do they want to build?

Have they come to you for advice?
Did they take your advice?

Is their solution reasonable? Is it possible?
What improvements would you suggest?

Is their solution complete?
Are all the steps/pieces outlined?

Have they started detail design?
Have they started building?
Have they started testing?

3. CORRECTIONS:

List missing things, potential problems, things to fix
The more question marks, the lower the rank.
The clearer the better.

4. LABOR:

Start planning who will build what projects.

BUILD/DESIGN REPORT I EVALUATION SHEET

Supervisor: _____

Project Name: _____ Team #: _____

Mark:	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**
	outstanding		excellent	very good		good		fair	poor	

TECH TIME: ~ _____hrs/month **CONTACT:** _____

M.E. Dept. Contribution: $_____ _____

BUILD WHAT:

FAB TYPE:

Was the proposal clear & concise?	__ very good	__ good	__ fair	__ no
Was the proposal challenging?	__ very good	__ good	__ fair	__ no
Consultation with technicians?	__ very good	__ good	__ fair	__ no
Has team begun testing?	__ very good	__ good	__ fair	__ no
Has team begun construction?	__ very good	__ good	__ fair	__ no
Is their solution reasonable?	__ very good	__ good	__ fair	__ no
Tech. Diagrams:	__ very good	__ good	__ fair	__ poor
Budget:	__ very good	__ good	__ fair	__ poor

SPECIFIC COMMENTS: **See next page**

BUILD/DESIGN REPORT I EVALUATION SHEET
(continued)

SPECIFIC COMMENTS:

List missing things, potential problems, things to fix.
Is their solution complete? Are all the steps outlined?

JM

TECHS

BUILD/DESIGN REPORT II EVALUATION SHEET

Supervisor: _____

Project Name: _____ Team #: _____

Mark:	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**
	outstanding		excellent	very good		good		fair	poor	

% DONE:	**__ very high**	**__ high**	**__ avg**	**__ below avg**
Certainty of #'s	**__ very good**	**__ good**	**__ fair**	**__ poor**

Was the proposal clear & concise?	__ very good	__ good	__ fair	__ no
Was the proposal challenging?	__ very good	__ good	__ fair	__ no
Consultation with technicians?	__ very good	__ good	__ fair	__ no
Has team begun testing?	__ very good	__ good	__ fair	__ no
Has team begun construction?	__ very good	__ good	__ fair	__ no
Is their solution reasonable?	__ very good	__ good	__ fair	__ no
Tech. Diagrams:	__ very good	__ good	__ fair	__ poor
Budget:	__ very good	__ good	__ fair	__ poor

SPECIFIC COMMENTS: **See next page**

BUILD/DESIGN REPORT II EVALUATION SHEET
(continued)

SPECIFIC COMMENTS:

List missing things, potential problems, things to fix.
Is their solution complete? Are all the steps outlined?

JM

TECHS

5. 3 Report evaluation sheets.

DECEMBER REPORT EVALUATION SHEET

Note: To be completed by the supervisor

Supervisor: _____

Project Name: _____ Team #: _____

Circle Mark:

A+	A	A-	B+	B	B-	C+	C	C-	D	F
30 29	28 27	26	25 24	23	22	21	19	18	17	<15
top 10%, all reports	excellent		v. good	good			fair		poor	

IF A+, D or F, JUSTIFY:_____

Was the report clear and concise?	**__ yes**	**__ partly**	**__ no**
How much testing has been done?	**__ a lot**	**__ some**	**__a little**
Has much construction has been done?	**__ a lot**	**__ some**	**__ a little**

Clear Problem Definition	__ very good	__ good	__ fair	__ poor
Report Presentation:	__ very good	__ good	__ fair	__ poor
Grammar / Spelling:		__ good	__ fair	__ poor
Design Selection:	__ very good	__ good	__ fair	__ poor
Detailed Design:	__ very good	__ good	__ fair	__ poor
Tech. Diagrams:	__ very good	__ good	__ fair	__ poor
Budget	__ very good	__ good	__ fair	__ poor
Gantt Chart / Timeline	__ very good	__ good	__ fair	__ poor
Conclusion/Recc:	__ very good	__ good	__ fair	__ poor
Referencing:	__ yes	__NO for images	____NONE	

SPECIFIC COMMENTS:

Was there anything especially good?, Was there anything missing/wrong?

FINAL REPORT EVALUATION SHEET

Note: To be completed by the supervisor

Supervisor: _____

Project Name: _____ Team #: _____

Circle Mark:

A+	A	A-	B+	B	B-	C+	C	C-	D	F
30 29	28 27	26	25 24	23	22	21	19	18	17	<15
top 10%, all reports	excellent		v. good	good			fair		poor	

IF A+, D or F, JUSTIFY:_____

Did they complete the device?	**__ yes**	**__ partly**	**__ no**	
How well did it work?	**__ very good**	**__ good**	**__ fair**	**__ poor**
Did they meet their design goals?	**__all**	**__most**	**__some**	**__few**
Was the report clear and complete?	**__ yes**	**__ partly**	**__ no**	

Clear Problem Definition	__ very good	__ good	__ fair	__ poor
Report Presentation:	__ very good	__ good	__ fair	__ poor
Grammar / Spelling:		__ good	__ fair	__ poor
Design Selection:	__ very good	__ good	__ fair	__ poor
Detailed Design:	__ very good	__ good	__ fair	__ poor
Tech. Diagrams:	__ very good	__ good	__ fair	__ poor
Budget	__ very good	__ good	__ fair	__ poor
Gantt Chart / Timeline	__ very good	__ good	__ fair	__ poor
Conclusion/Recc:	__ very good	__ good	__ fair	__ poor
Referencing:	__ yes	__NO for images	____NONE	

SPECIFIC COMMENTS:

Was there anything especially good?, Was there anything missing/wrong?

5.4 Lab book evaluation sheet.

LAB BOOK EVALUATION SHEET

Supervisor: _____

Student: _____ Team #: _____

Mark: **10** **9** **8** **7** **6** **5** **4** **3** **2** **1**
outstanding excellent very good good fair poor

Was the lab book clear and complete? __Yes __ Partly __ No

Name and Info: __ Yes __ partly __No

Table of Contents: __ Yes __ partly __ No

Numbered Pages: __ Yes __ partly __ No

Neat / Legible: __ Yes __ partly __ No

No Loose Sheets: __ ok __ loose sheets

Figures and Diagrams: __ v. good __ good __ poor

Technical Content: __ v. good __ good __ poor

Completeness / Length: __ v. good __ good __ poor

SPECIFIC COMMENTS:
Was there anything especially good?, Was there anything missing/wrong?

5.5 WWW page evaluation sheet

WWW pages are marked based on problem definition, design info, clarity, ease of navigation, richness. The following questions were posed:

- "Can I understand the Project and Solution?"
- "Is the web page interesting (visual / detailed / layered / rich)?"

Speed: keep images medium size (not huge) with clickable zoom-in/blowups if necesssary.
Keep movies short (do not place movies on youtube.com) and preview with still images, make the organization hierarchical

Team #	prob. def.	design info	clarity/ easy nav	richness	Mark	COMMENTS
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

5.6 Student Participation evaluation.

STUDENT PARTICIPATION EVALUATION SHEET

Note: This year you do not need to fill out this form for any of the students provided you feel all did their fair share of the work. If, houwever, you would like to give different participation grades please fill out this form.

Supervisor: _____

Team #: _____

DID THE STUDENTS CARRY THEIR SHARE OF THE WORK LOAD?

At the end of each term, when submitting individual lab books,
each student must submit a 1 page memo outlining work or share of work done.
The memo should be short and concise.

Supervisors may also request face-face meetings with all students.

Factors to consider:

Participation in weekly meetings, Presentations, Report writing, Web page Design, Construction, Testing, CAD drawings, Simulations, Fund raising, etc.

SHOULD STUDENTS RECEIVE DIFFERNT LETTER GRADES FOR THEIR PARTICIPATION ? IF YOUR ANSWER IS YES, THEN FILL THE FORM BELOW.

Student name	Share (%)

COMMENTS:

5.7 Device testing evaluation sheet.

TEST SUMMARY EVALUATION SHEET

Supervisor: _____

Project Name: _____ Team #: _____

Mark:	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**
	outstanding	excellent	very good		good	fair		poor

COMPLEXITY OF PROJECT	**__v. high**	**__high**	**__average**	**__low**
DID IT WORK?	**__ yes**	**__mostly**	**__ partly**	**__no**
If no, did they explain why?	__ v. good	__ good	__ fair	__ poor
WAS THEIR OWN EVALUATION ACCURATE?	**__ yes**	**__mostly**	**__ partly**	**__no**

Did they meet their goals?	__all	__most	__some	__few
Evidence of improved design?	__ v. good	__ good	__ fair	__ poor
Quantity/Volume of Testing	__v. high	__high	__average	__low
Long Term Testing?	__yes	__some	__a little	__no
Did the report include hard data?	__ v. good	__ good	__ fair	__ low
Was the report clear & complete?	__ v. good	__ good	__ fair	__ poor

SPECIFIC COMMENTS:

Was there anything especially good?, Was there anything missing/wrong?

5.8 Mech4010/4020 – Design Project I/II – Ranking by students

STUDENT'S NAME: _____TEAM#:_____

DP students, this is your chance to evaluate your classmate's projects. Every student must submit this form at the end of the presentations to either the TA or the coordinator. **5%** of the course mark is reserved for your choice as to the best projects. These points are for outstanding projects, only your collective top 5 choices will receive points (5,4,3,2,1). You are evaluating the whole project, not just presentation, not just construction. You should ask the following questions:

- How challenging was their project?
- What was the quality of Engineering/Design Work?
- Did they complete construction?
- Did they test it? Did it work? Were they accurate in their own evaluation?
- How good was their presentation?
- Overall this team ranks: HIGH, MIDDLE, LOW

Fill out this form only after you have seen all of the presentations and give it to the TA. **Do not rank your own team**. **Note:** You should not consult with your classmates or even team mates when giving the ranking at the end of the presentations. You should only assign 5 HIGH ranks, 5 MIDDLE ranks and rank the reminder as LOW.

Team #	Project title	Rank (H, M or L)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		

5. 9 Mech4010/4020 – Design Project I/II – Evaluation by Professors

PROFESSOR'S NAME:_____SUPERV.TEAM#:_____

Every professor must submit this form to the Design Project coordinator on the day following the final presentations. **5%** of the course mark is reserved for your choice as to the best projects. These points are for outstanding projects, only your collective top 5 choices will receive points (5,4,3,2,1). You are evaluating the whole project, not just presentation, not just construction. You should ask the following questions:

- How challenging was their project?
- What was the quality of Engineering/Design Work?
- Did they complete construction?
- Did they test it? Did it work? Were they accurate in their own evaluation?
- How good was their presentation?
- Overall this team ranks: HIGH, MIDDLE, LOW

Do not rank your own team. Evaluate the **presentation using letter grades and give the ranking as either HIGH, MIDDLE or LOW**. You should only assign 5 HIGH ranks, 5 MIDDLE ranks and rank the reminder as LOW.

Team #	Project title	Rank (H, M or L)	Presentation (letter grade)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			

5.10 Feedback

1 per TEAM

OPTIONAL

NO HAND-IN REQUIRED

Class evaluations are not done for Design Project since in addition to the coordinator there are many professors involved supervising and evaluating the students. Different teams will have different circumstances. In addition comments made about a team supervisor would not really be anonymous (only ~4 persons/team).

The deptartment would rather receive comments from teams rather than individuals, so that we know they represent the views of more than 1 person

For client/supervisor related comments, please see the course coordinator in person.

For course related comments, please see either myself or, if you prefer, the department head.

CLIENT:

How was the relationship with your client? Were there any problems?

SUPERVISOR:

How was the relationship with your supervisor? Were there any problems?

COURSE:

Were there problems with the course?

What advice would you give to someone who taking this course next year?

Name 1 thing you would change in this course.

APPENDICES

A.1 Sample design project agreement.

This Agreement is made and entered into for a term beginning the _____ day of _____, 2002 and ending the _____ day of _____,_____ BETWEEN:

Design team members
Halifax, Nova Scotia

hereinafter referred to as "Design Team"

and

Client Name
Address

hereinafter referred to as "Client"

The Design Team and Client hereby agree as follows:

1. SCOPE OF WORK

The Design Team shall perform the work described in the Statement of Work attached as Appendix A (hereinafter referred to as the "Project"). A detailed report and prototype of the Project shall be presented to Client on or before _____, 2004 .

2. PRINCIPAL INVESTIGATOR(S)
The Principal Investigator(s) of the Project shall be:

Student 1
Student 2
Student 3
Student 4,

students at the Department of Mechanical Engineering, Dalhousie University

3. CONFIDENTIALITY AND PUBLICATION

The Project and corresponding presentations, reports and web pages will be in the public domain.

4. OWNERSHIP OF INTELLECTUAL PROPERTY

Intellectual Property (IP) shall remain the sole property of the Client.

5. INDEMNITY

Each party shall indemnify and save harmless the other party against all costs, actions, suits, claims, losses or damages for all matters arising out of this Agreement and the performance of the Project, except to the extent same were caused by the other party's default, negligence, or willful misconduct.

The Client shall indemnify the Design Team and Dalhousie University against all costs, suits, or claims resulting from the use by Client or its customers or licensees of any deliverable or intellectual property developed by the Design Team under this Agreement.

6. WARRANTIES

Neither the Investigator nor Dalhousie University, including its fellows, officers, directors, employees and agents, makes any conditions, representations, warranties, undertakings, promises, inducements or agreements of any kind, whether direct, indirect, collateral, express, or implied, as to any matter whatsoever, including, without limitation, the results of the research or any inventions or product, tangible or intangible, conceived, discovered, or developed under this Agreement; or the ownership, merchantability, or fitness for a particular purpose of the research results of any such invention or product. Dalhousie University and the Investigator shall not be liable for any direct, indirect, consequential, or other damages suffered by Client or any others resulting from the Project or the use of the research results/data of the Project or any such invention or product.

7. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes all prior agreements, understandings, negotiations and discussions, whether written or oral. There are no conditions, covenants, agreements, representations, warranties or other provisions, express or implied, collateral, statutory or otherwise, relating to the subject matter hereof except as herein provided.

IN WITNESS WHEREOF, the duly authorized officers of the parties have executed this Agreement as of the day and year first written above.

Student 1 _____

Student 2 _____

Student 3 _____

Student 4 _____

Client _____

A.2 Sample design project waiver

This Agreement is made and entered into for a term beginning the _____ day of _____, 2012 and ending the _____ day of _____,_____ BETWEEN:

Design team members
Halifax, Nova Scotia

hereinafter referred to as "Design Team"

and

Client Name
Address

hereinafter referred to as "Client"

The Design Team and Client hereby agree as follows:

1. INDEMNITY

Each party shall indemnify and save harmless the other party against all costs, actions, suits, claims, losses or damages for all matters arising out of this Agreement and the performance of the Project, except to the extent same were caused by the other party's default, negligence, or willful misconduct.

The Client shall indemnify the Design Team and Dalhousie University against all costs, suits, or claims resulting from the use by Client or its customers or licensees of any deliverable or intellectual property developed by the Design Team under this Agreement.

2. WARRANTIES

Neither the Investigator nor Dalhousie University, including its fellows, officers, directors, employees and agents, makes any conditions, representations, warranties, undertakings, promises, inducements or agreements of any kind, whether direct, indirect, collateral, express, or implied, as to any matter whatsoever, including, without limitation, the results of the research or any inventions or product, tangible or intangible, conceived, discovered, or developed under this Agreement; ***or the ownership, merchantability, or fitness for a particular purpose of the research results of any such invention or product.*** Dalhousie University and the Investigator shall not be liable for any direct, indirect, consequential, or other damages suffered by Client or any others resulting from

the Project or the use of the research results/data of the Project or any such invention or product.

3. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes all prior agreements, understandings, negotiations and discussions, whether written or oral. There are no conditions, covenants, agreements, representations, warranties or other provisions, express or implied, collateral, statutory or otherwise, relating to the subject matter hereof except as herein provided.

IN WITNESS WHEREOF, the duly authorized officers of the parties have executed this Agreement as of the day and year first written above.

Student 1 _____ Date _____

Student 2 _____ Date _____

Student 3 _____ Date _____

Student 4 _____ Date _____

Client _____ Date _____

A.3 How should potential clients propose a a design project idea.

The MECH department lists proposed project ideas at

http://www.me.dal.ca/~DP_MECH/project_ideas.pdf

Design Projects run from September to May each year.
Posting are made June to September, ideas are from accepted June to September.

SUBMITTING A PROJECT IDEA

Please email the following information to the DP coordinator: jmilitze@dal.ca

Project title:	2-4 words
Summary:	100 words maximum (1 www link maximum).
Sponsor:	name
Contact:	name & email or phone number
ME faculty interest:	optional: any ME profs to be contacted

Your project idea will be evaluated by the DP coordinator,
if acceptable it will be given a project letter and listed.

WHAT MAKES A GOOD PROJECT IDEA?

Right Topic:
The project should be mostly Mechanical in nature. It can have other aspects (e.g. electrical engineering), but it should be primarily Mechanical.

Right Size:
Look for a project that can be completed by 4 students in 8 months (4 months planning & 4 months construction). Some Teams will receive technical support from our dept. staff.

Funding:
Choose a project that is feasible within the financial resources of the client.

STUDENT SELECTION

In early September Mechanical students select project ideas from the posted list, they then contact the sponsors/clients. Some project ideas are chosen, some are not.

A project idea is not enough for the students. Students must submit a full project proposal: a project idea, a team of 4 students and a ME faculty supervisor.

A.4 Construction ideas

The following are simple ideas / hints are taken from solutions that students came up with in previous years:

For hi torque motors

Cordless screwdrivers, $20+
Windshield wiper motors: available as surplus, ~$20

For precision motion

Stepper motors:

very precise (~1^{o} /step),
but low torque!, low maximum speed,
need driver electronics, ~complex, see Greg
available as surplus, ~$5-20

Other motors

R/C Servos:

middle range precision and torque,
normally have limited motion (~180^{0}),
need driver electronics, see Greg
starting price ~$20+

Tamiya motors:

cheap(~$20) & simple, (<1W)
variable gear ratios,
low to middle range of torque

Small gear reductions

Belt & pulleys:

length tolerant, cheap,
can stack for variable G.R.,
5/8” shaft = copper pipe
round belts can twist 90^{0}

Steel pulley &

roller blade wheel:

cheap & simple

Large force

Power screw (limited length)

Low friction

Lazy Susan or cabinet slides (but can be loose)

Gears

non-spur gears are harder to find
small metal gears, see Albert & Angus
small plastic gears, see T. Hubbard

Limit switches

micro switches
cheap & reliable,
N/O & N/C

Mockups

balsa	Maritime Hobby, Kent,
foamcore	Loomis Art Supply
MDF	Kent, Home Depot
copper pipe	Can. Tire, Kent, Home Depot
misc	Can.Tire, Atl. Fabrics, Walmart
surplus	Princess Auto
science	Eftson Science

Bike parts

sprockets & chains
brakes
ratchet / free-wheeler
wheels
computer
never mount chains vertically (they will slip)
idlers & dérailleurs cost efficiency

Use stock parts

from bike, car, skidoo, plumbing supplies, whatever,
cheap, reliable, available/fast

Racks

long racks are harder to find
are there powers screw alternatives?
crude racks can be made by welding bike chains
to a plate and using a bike sprocket as the gear.

Cutting

90º angles if possible, 45º acceptable

Welding

Some aluminum alloys lose a lot of their strength if welded!

Alignment

Do you need a coupler? flexibility vs. strength

Cantilevers

Never cantilever anything if you can avoid it

Cameras

Lighting is key for good image quality. You can never have enough light. Always sun to your back!, no back lit images.

Web cam? (low quality)
Digital Camera? (do not open a digital camera!)
CCD? try supercircuits.com,
check lines and lux ratings
B&W more light sensitive e/ sharper than color

Fiberglass

Lots of steps, lots of elbow grease, safety issues
Fiberglass damages tables!
Epoxy eats foam!

Surplus Suppliers

Princess Auto
81 Wright Av.
Burnside Dartmouth

C&H Sales
Pasadena CA,
http://aaaim.com/CandH/

Find Anything Mechanical

McMaster-Carr
www.mcmaster.com Peter Jones has 1 catalogue

A.5 Safety Manual

The following text on safety was adapted from the rules used in the Mechanical and Environmental Engineering program at the University of California San Bernardino campus. The Mechanical Engineering Department would like to express its gratitude to Mr. David Bothman for his permission to adapt and use this material.

The Basic Rules

1. **Never work alone.**

   At least two adults must be in the shop when power tools are being used.

2. **Never work when you are impaired.**

   This includes when you are too tired, stressed or hurried to work carefully.

3. **If you cannot do a job safely in this shop, don't do it.**

   There are limits to what we can build here.

4. **Always wear closed-toe shoes in the shop.**

   Tools, chips and fixtures are sharp, and often hot. Shoes will help protect your feet from injury. Leather shoes are preferred when welding.

5. **Eye protection is essential. Always wear safety glasses when working or cleaning tools.**

   Each student receives a pair of safety goggles at the beginning of the second term. These must be worn all the time while working in the shop .

6. **Remove or secure anything that might get caught in moving machinery.**

   Rings, necklaces, long hair and loose clothes that get caught in tools can drag you along.

7. **Keep your hands away from sharp tools.**

   Make sure that nothing that you do will cause you to be cut.

8. **Dust, chemicals and smoke can be dangerous – work in well-ventilated areas, minimize contamination and use appropriate protective equipment.**

   If you are going to be doing any heavy sanding, grinding or using harmful chemical you must wear an appropriate breathing protection mask. Please ask the technician to get you one when needed.

9. **If you're unsure about the safe operation of a tool or any aspect of a job – ask for help! Have shop staff check you out on a tool the first time you use one with which you are unfamiliar.**

10. **Clean up after yourself.**

    Before you leave the shop each day all tools must be returned to the toolbox, the machine cleaned and wiped down and the floor swept. Leave 10-15 minutes for cleanup. Those individuals that fail to clean after themselves may have their shop privileges suspended or removed.

Information about the Shop

The Faculty Machine Shop is administered by a technician. Before giving permission to a student to use the shop the machine shop technician will ensure that he/she has the proper training, either through taking an introductory machining course offered by NSTI or from previous technical degrees or shop experience. The welding shop and adjacent labs and the student design project room, are for student to carry out assembly and small operations such as light grinding, drilling and sanding. Everyone must read this safety handout and pass a safety test before using the tools in the shops.

The goal of this handout is to summarize the risks that are inherent in metalworking and to provide some guidelines for working safely. It is **not** intended to be a machining training manual. There are several good books in the library and references on the web. The first step in preventing personal injury or machine damage is to make sure that you know how to operate the equipment you will be using correctly. **If you are unsure – ask!**

Because it is a communal area, used by so many people, it is important to keep the shop clean and orderly. This means that every user must clean the machines and work areas they use, and put away all tools and material before leaving the shop.

Inattention, hurried work, horseplay, bad judgment, fatigue, improper clothing, defective tools, and poorly secured workpieces cause most accidents. Avoid accidents by following all of the rules in this handout and asking for help if you are unsure about the safest approach.

Disregarding shop rules, working unsafely or leaving a mess will result in suspension of shop privileges.

These rules apply to the entire shop area including the design project studio.

In an Emergency:

Call Security (494 6400, or use one of the direct phones in the hall), and report the nature and the location of the accident. The building is called C1 and it is located on the Sexton Campus. The room numbers are:

Machine Shop - room C056

Design Studio - room C101

Wind Tunnel lab - room C151

Fluid Mechanics lab - room C152

Welding Shop - room C153

IC Engines lab - room C155.

Shop Hours:

Regular hours: M-F 8 – 16h. Students may work after hours (not in the Machine Shop) and weekends, provided there are at least two people in the given shop.

Sign-in Book:

Each shop has a sign in book and all users must sign in before beginning work! The location of the book is clearly indicated in each shop. Students that fail to sign in (and out) may have their shop privileges removed.

General Safety Guidelines

1. Do not attempt to remove foreign objects from the eye or body. Have someone take you to the ER of the Infirmary. If chemicals get in the eye(s), wash eye(s) for 15 minutes in an open flow of water before proceeding for medical treatment. **Notify campus security at 494 6400, if necessary they can call 911**
2. Avoid excessive use of compressed air to blow dirt or chips from machinery to avoid scattering chips. Never use compressed air guns to clean clothing, hair, or aim the gun at another person.
3. Machines **must be shut off** when cleaning, repairing, or oiling.
4. Do not wear ties, loose clothing, jewelry, gloves, etc. around moving or rotating machinery. Long hair must be tied back or covered to keep it away from moving machinery. Hand protection in the form of suitable gloves should be used for handling hot objects, glass or sharp-edged items.
5. Wear appropriate clothing for the job (i.e. do not wear short sleeve shirts or short pants when welding).
6. Do not work in the shop if you are tired or in a hurry – this almost always ruins the work, and often results in injury.
7. Never indulge in horseplay in the shop areas.
8. All machines must be operated with all required guards and shields in place.
9. A brush, hook, or special tool is preferred for removal of chips, shavings, etc. from the work area. **Never** use your hands to clean cuttings – they are sharp!
10. Keep your fingers clear of the point of operation of machines by using special tools or devices, such as, push sticks, hooks, pliers, etc. **Never use a rag near moving machinery.**
11. A hard hammer should not be used to strike a hardened tool or any machine part. Use a soft-faced hammer.
12. Keep the floor around machines clean, dry and free from trip hazards. Do not allow chips to accumulate.

13. **Think through the entire job before starting**. Ask for help if you have questions.

14. Before starting a machine, always check it for correct setup and always check to see if machine is clear by operating it manually, if possible.

15. Do not drink alcoholic beverages before or during work in the machine shop area. Do not bring food or snacks into the shop. If you want to eat or drink go to the Design room or the Alumni Lounge.

16. If you have not worked with a particular material before, check the hazardous materials data sheets book for any specific precautions to be taken while working with the material. Also, ask the shop personnel before cutting any unusual material.

17. Heavy sanding and grinding should only be done in well-ventilated areas, preferably outdoors. Before doing any major painting consult the lab manager for instruction**.**

18. Follow all appropriate precautions when working with solvents, paints, adhesives or other chemicals. Use appropriate protective equipment.

19. Safe procedures for most shop operations are described in the safety manual located in the safety section of the shop or lab.

20. Check the power cords and plugs on portable tools for before using them.

21. Always store oily rags in an approved metal container.

Guidelines for Cleaning

1. Turn off power to the machine before cleaning. This will avoid accidentally starting the machine and injuring yourself.
2. Remove cutting tools. Take out drill bits, mills and remove lathe tools to reduce the chances of getting cut. On the table saw lower the blade completely.
3. Put away all hand tools and other items around the tool so that you don't make them dirtier.
4. Clean chips from the tool, the chip pans. Recycle clean chips where possible.
5. Put a light coat of way oil on the machine ways. Ask staff to show you where this oil is kept.
6. Sweep the floor in the area where you have been working.
7. Do not over use compressed air. Do not blow air into the bearing surfaces, and do not scatter chips all over the shop. Sometimes a shop vacuum works better than the air gun.
8. Report missing, broken or damaged tools to shop staff.
9. Spend five minutes on general cleaning around the shop. We're all in this together.

A.6 Report writing

The following are useful links that may help in writing your final report.

http://www.kevinboone.com/contact.html
http://www.cse.yorku.ca/course_archive/2002-03/F/ENG1000/Eng1000_Tech_Reports.pdf

Dalhousie Library references;
http://www.library.dal.ca/How/
Plagiarism:
http://infolit.library.dal.ca/tutorials/QuoteNote/
How to use RefWorks
http://www.library.dal.ca/How/RefWorks/

Creating an Adobe Catalogue
http://www.adobe.com/designcenter/acrobat/articles/acr6arindex/acr6arindex.pdf