

# Writing in the Repair Café

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## Environmental scans/and faculty discussions revealed . . .

- Excellent senior Engineering projects suggest that no one graduates from engineering without strong communications skills, yet professors regularly complain about student abilities
- Satisfactory amounts of writing in upper years, yet few rubrics, rare formative feedback—and no specific instruction in writing
- Students still need to take the ELPE (English language proficiency exam), which most pass
- In September 2014, one ME prof volunteered to require writing throughout a concepts course . . .

# Welcome to ME 100!

## Official Calendar Description:

This course is focused on fundamental knowledge and skills essential for academic and professional development in mechanical engineering. It covers basic methods and principles used by mechanical engineers, e.g., fundamentals of technical communication, the design process and problem solving, measurements and data analysis, engineering professionalism, safety, and intellectual property. The fundamentals of engineering graphical communication using computer-aided design (CAD) and freehand sketching will be a significant component of this course. Written, graphical and oral communications are emphasized. Examples are drawn from Mechanical Engineering. [Offered: F]

**What It Really Means:** This is the introduction to our profession. You will do the work in this course that models what Mechanical Engineers do in daily professional life. You are genuinely a “student engineer” in this course, and we will hold you to the strictest standards of professionalism and collegial behaviour.

# ME 100: Course Objectives

- introduce the field of Mechanical Engineering
- introduce engineering design
- experience design process in a real design application
- explore critically what problems are worth solving and how ideas are generated
- understand functional requirements of users
- communicate effectively using written, graphical, and verbal methods
- develop drawing, writing and verbal communication skills using a range of engineering tools
- develop attitudes and conduct appropriate for a professional engineer
- interact responsibly with colleagues, clients and society

# Impossible without the WEEF TAs!

- 5 TAs: specially selected co-op students hired to work 35 hours/week for 16 weeks
- 1 TA for approx. 40 students
- Regular office and clinic hours in addition to two hours of tutorials led each week
- Responsible for all grading, but followed clear rubrics, which were (of course) shared with the class
- Course professor, who designed all assignments and rubrics, reviewed marking and grades each week, assisted by a Writing Centre instructor, who surveyed and guided feedback on writing

## ME100/101: MECHOSYSTEM

### Request for Proposals

*Andrew Trivett, Jen Fung, Frank Li, Matthew Grisebach*

The field of Mechanical Engineering is poorly understood by the general public. Many Canadians don't have a good appreciation of the important role that our discipline serves for society. As the largest, and arguably the best first-year Mechanical Engineering class in Canada, the ME class of 2019 is requested to develop concepts for a public exhibit to help communicate to anyone an important and compelling picture of Mechanical Engineering.

You are requested to develop an exhibit to be installed in the main lobby of Engineering-5 to represent the field of Mechanical Engineering to the public as imagined by your class. Your exhibit will accept, as input, a single 2-1/2inch (63.5mm) chrome steel ball delivered at a speed of 0.5 m/s. The ball should initiate an activity or activities. The exhibit will deliver the same steel ball at the same speed to a follow-on device created by the next class of ME. What happens after your design receives the ball, and before it gives it to the next exhibit is entirely up to the class.

The exhibit must have high visual and tactile impact, and must be accessible to all, regardless of the viewer's culture, ethnicity, origin, gender, age, sex, sexual orientation or abilities. The exhibit will be interactive, and will be the first link in an annual recurring chain of designs.

The most promising concepts that result from ME100 will be subjected to a proof-of-concept evaluation stage during ME101. One exhibit per cohort resulting from the proof-of-concept trials will be constructed professionally and installed in the department. Each class will carry on the chain of exhibits in the future, building upon the theme and literally "carrying the ball" from class to class. In this way, your exhibit can one day be one step in a never-ending loop of processes imagined by UWaterloo engineering students. This will become a department tradition, a reflection of your class' values and vision of the future.

***An authentic  
assignment!***



At the outset . . .

This first week is essential in starting your life as a student engineer. How you write and speak to others will begin to develop your professional reputation. Be respectful, truthful, and sincere.

**NOTE: YOUR COMMENTS IN THIS DISCUSSION WILL FORM A LARGE PART OF YOUR COURSE GRADE! WHAT YOU SAY WILL BE READ BY THE WHOLE TUTORIAL GROUP OF YOUR CLASSMATES, BY THE TEACHING ASSISTANTS, BY THE WRITING CENTER SUPPORT COACHES, AND BY THE PROFESSORS.**

# Design Communication and Professionalism (60% of final grade):

- Résumé activity (**10%**)
  - professional résumé (purpose: recruitment to an in-class design team)
  - participation in class discussion and online forums
- Initial Conceptual Design Proposal (**25%**): response to the MechoSystem RFP
  - team charter
  - team proposal (team members share grade)
  - communication in online forums and face-to-face meetings with colleagues (individual grades)
- Design review presentation (**10%**)
  - team presentation
  - individual participation in workshops
- Design progress report (**40%**)
  - final report
  - communication in online forums and face-to-face meetings with colleagues (individual grades)
- Conceptual Design Presentation (**15%**)
  - presentation in a formal conference setting



# Team Charter Rubric

Criteria	Level 3 2.5 points	Level 2 1.25 points	Level 1 0 points
<b>CONTENT</b>	Sufficient numbers of items are considered to show that the team has seriously considered all the possible issues to come out of their work	The agreement is lacking in several areas, but what is present is generally workable	Insufficient content has been considered to make the agreement cover eventualities
<b>FAIRNESS</b>	The charter is fundamentally fair to the team members and has been signed and supported by all team members	Most of the terms of the agreement appear fair, but some items may be problematic and could be misunderstood to the detriment of team members	One or more clauses appear to be unfair to certain members of the team, or the agreement has insufficient depth to evaluate its fairness, or all members of the team have not signed the agreement
<b>SPECIFICITY</b>	The items and terms in the agreement are very specific to addressing issues and give actionable guidance as to what shall be done in all eventualities	The agreement is generally sound, but lacks specific details of what to do in certain situations	The agreement is too vague to cover specific items in the team activities
<b>CLARITY</b>	The language and grammar are clear and do not detract from understanding the intent of the items	The language and grammar are readable, and mostly clear, but some items are poorly edited or make it difficult to understand specific items	The language and grammar are a hindrance to understanding the meaning of the agreement

How did students respond? They loved the repair café! <https://traxxas.com/>

- Half the team takes a working Traxxas RC car apart, takes notes and sketches
- The other half of the team has to put the car back together following oral and written instructions from their teammates
- The writing requires correlating this experience to beginning concepts for their mechOsystem
- The activity is repeated for 3 weeks, providing lots of practice—with feedback!

# Student marks improved throughout the term

	Résumé Critique (Out of 10)	Résumé (Out of 10)	Week 2 (Out of 10)	Week 3 (Out of 10)	Week 4 (Out of 10)	Team Charter (Out of 10)	Discussion Forum 7-9 (Out of 10)	Discussion Forum 10-12 (Out of 10)	Discussion Forum (Out of 10)	Final Report (Out of 10)	Final Presentation (Out of 10)	Group Submissions (Out of 10)	Communication Mark	Graphics Mark	FINAL GRADE	
N=96	5.9	7.0	5.3	6.6	5.8	7.8	8.6	9.5	7.7	8.1	9.4	8.1	78.6	74.9	77.4	
N=103	5.8	6.6	6.4	7.0	6.1	8.2	8.1	9.5	7.8	7.8	9.3	8.1	79.3	77.7	79.0	
	6.3					8.4										

# Students (N=60) recognized their progress

How well did ME 100 prepare you for . . .

	1 (not at all)	2	3	4	5 (very well)	average
Collaborating with peers on a written document	1	6	11	31	11	3.75
Writing to an engineering audience	1	3	20	22	14	3.75
Working collaboratively	1	5	13	21	20	3.9
Evaluating and critiquing peers' ideas & designs	1	5	21	23	10	3.6
Analyzing problems & developing solutions	1	4	18	26	11	3.7

On a scale of 1 to 5 (1 = weak, 5 = strong), describe your communication skills when you started university

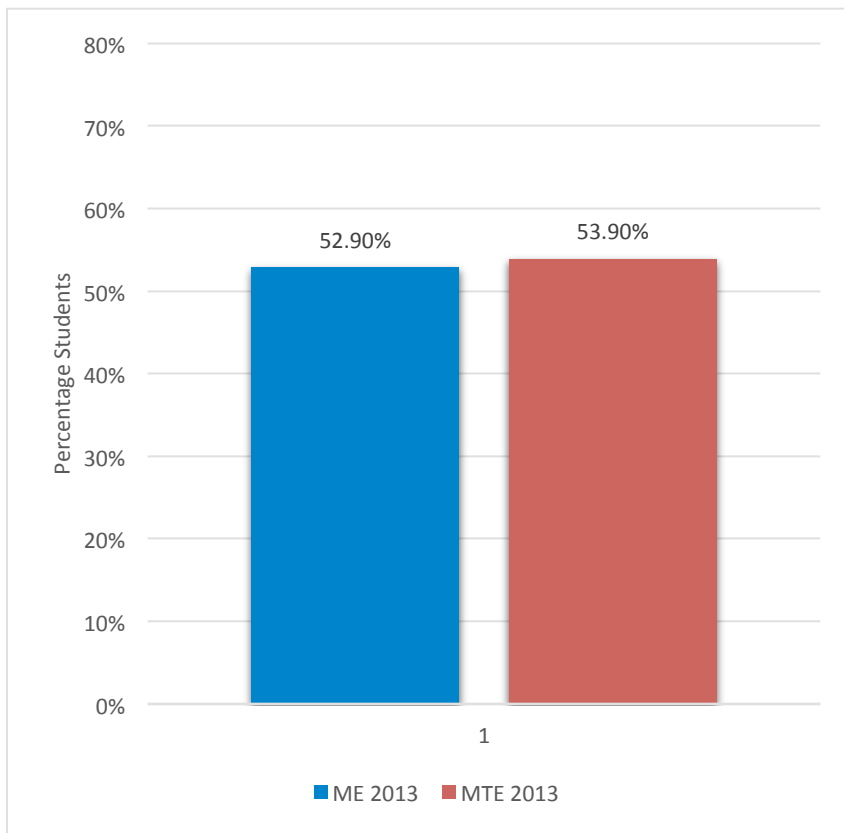
	1 (weak)	2	3	4	5 (strong)	Total	Weighted Average
1. Oral skills	<b>0.00%</b> 0	<b>13.33%</b> 8	<b>18.33%</b> 11	<b>40.00%</b> 24	<b>28.33%</b> 17	60	3.83
2. Written skills	<b>0.00%</b> 0	<b>5.00%</b> 3	<b>26.67%</b> 16	<b>28.33%</b> 17	<b>40.00%</b> 24	60	4.03
3. Interpersonal skills	<b>0.00%</b> 0	<b>6.67%</b> 4	<b>28.33%</b> 17	<b>46.67%</b> 28	<b>18.33%</b> 11	60	3.77
5. Intercultural skills	<b>3.33%</b> 2	<b>5.00%</b> 3	<b>35.00%</b> 21	<b>31.67%</b> 19	<b>25.00%</b> 15	60	3.70

On a scale of 1 to 5 (1 = weak, 5 = strong), describe your communication skills now:

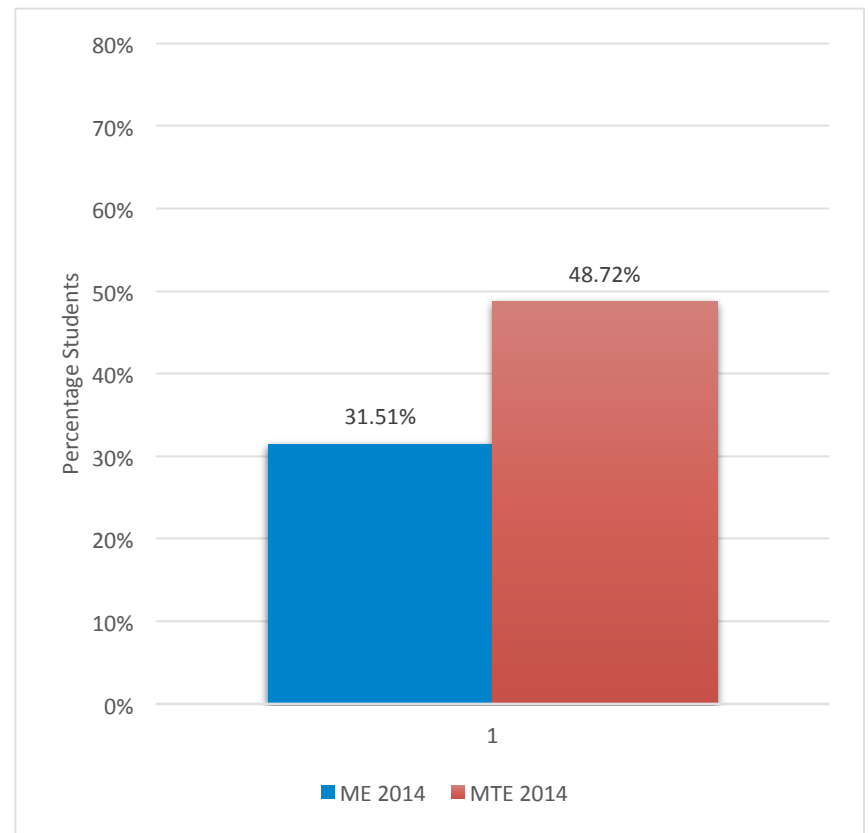
	1 (weak)	2	3	4	5 (strong)	Total	Weighted Average	
1. Oral skills	<b>0.00%</b> 0	<b>1.67%</b> 1	<b>15.00%</b> 9	<b>45.00%</b> 27	<b>38.33%</b> 23	60	+ .37	4.20
2. Written skills	<b>0.00%</b> 0	<b>1.67%</b> 1	<b>18.33%</b> 11	<b>36.67%</b> 22	<b>43.33%</b> 26	60	+ .19	4.22
3. Interpersonal skills	<b>0.00%</b> 0	<b>0.00%</b> 0	<b>23.33%</b> 14	<b>48.33%</b> 29	<b>28.33%</b> 17	60	+ .28	4.05
4. Intercultural skills	<b>1.67%</b> 1	<b>3.33%</b> 2	<b>23.33%</b> 14	<b>38.33%</b> 23	<b>33.33%</b> 20	60	+ .28	3.98

# ME 100 students completed assignments on time more often during Fall 2014 than in previous years

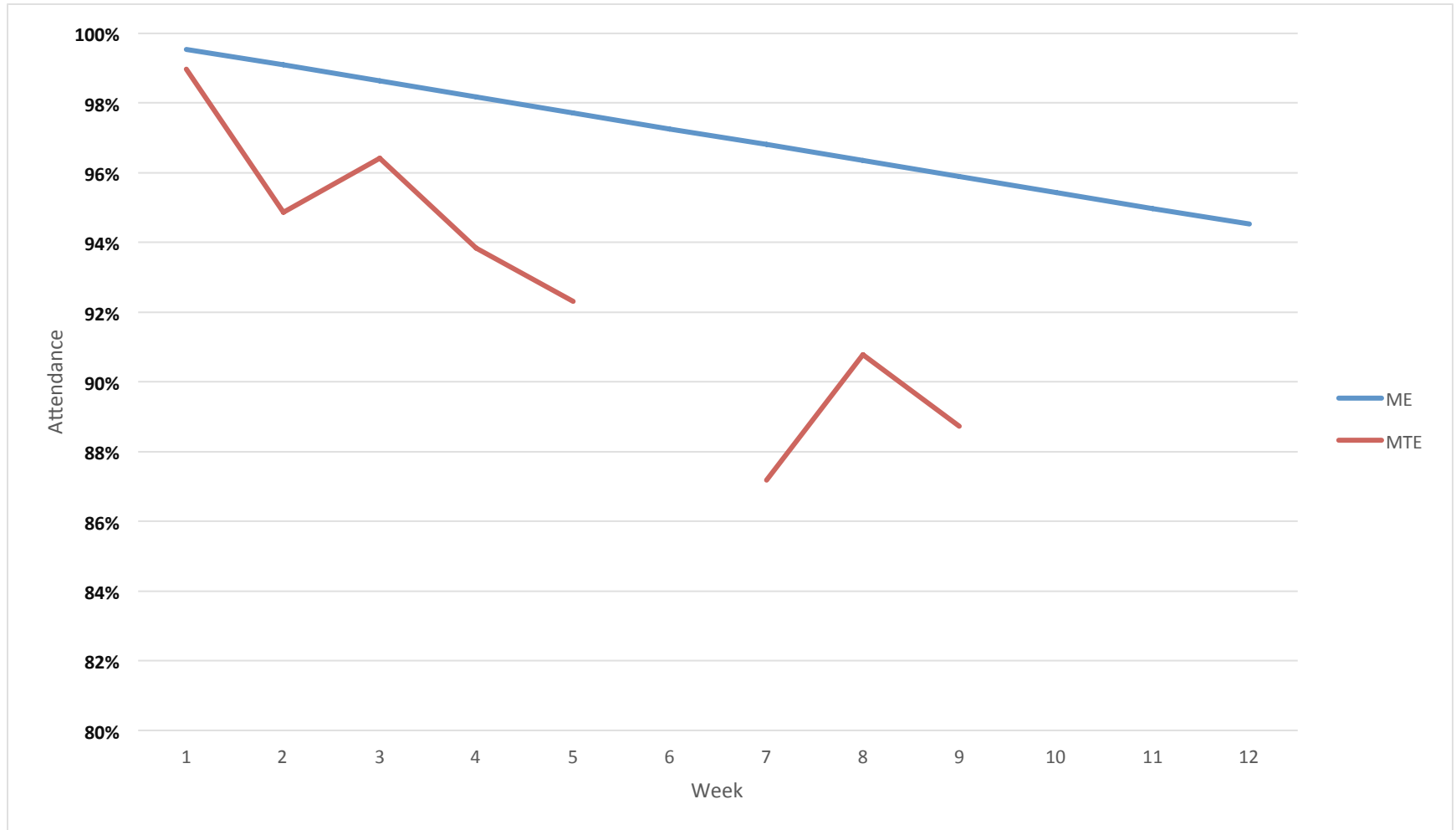
## Percentage using Graphics Late cards in 2013



## Percentage using Graphics Late cards in 2014



# And attendance at tutorials remained strong!



Graph: Yash Sewlani



# What we learned . . .

- Students who commented that they really didn't do much writing in the course explained that they actually didn't write essays
- Over the term we could see them write more —and with added specificity and confidence.
- The LMS was frustrating for everyone and unfortunately led to lower satisfaction overall
- TAs reported having learned what constitutes good writing and were willing to recommend the job to others: their highest rating [4/5] went to the Writing Centre workshop on marking and to their own confidence in their accurate judgements

To be continued . . .