

Teaching Portfolio

Mathematics, rightly viewed, possesses not only truth, but supreme beauty — a beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show.

A History of Western Philosophy
BERTRAND RUSSELL

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Contents

1 Teaching Philosophy	1
2 Teaching Résumé	2
3 Student and Peer Evaluations of Teaching	5
3.1 Course Evaluation for Math 10042 at Mohawk College, Fall 2019 Term	5
3.2 Student Feedback on 1LS3 Lesson	5
3.3 Peer Feedback	5
4 Professional Development	6
5 Personal Projects	7
A Teaching Evaluations	8
A.1 Mohawk College, Math 10042 Fall 2019	8
B Samples of Work	17
B.1 Syllabus	18
B.2 Sample Assignment and Solution	21



1 Teaching Philosophy

In my teaching I strive to instill, what I call, an *intuitive* understanding of the material. By this I mean that I want students to not simply accept something as truth, but to understand that the truth of it *must* be so. Gaining insight like this allows a person to massively broaden their horizons. It is the difference between a person being able to perform a task, versus understanding how and why the task needs to be done. A person with an intuitive understanding can not only perform the task, they can also understand why each step of the process is required. This allows people to far extend their possibilities beyond just that task, they gain the ability to do anything.

Empathy is an essential part of teaching. I always try to keep in mind that learning new things is difficult, and what may seem trivial to me is only easy because I have worked through it many times. It is important for me to remain respectful and empathetic when students encounter difficulty. Mutual respect between teacher and student is imperative to fostering a productive learning environment. I always treat students as I would a peer; intelligent and capable. This outlook is always rewarded with returned respect and increased engagement from the students. When I show that I respect the intelligence of my students, they are more willing to engage during class because I become more approachable and less of an intimidating authority figure.

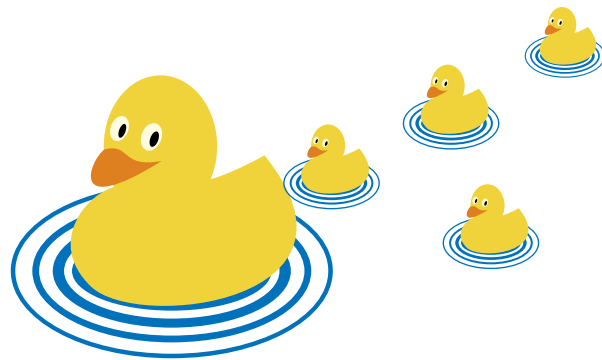
I believe patience is the most important virtue for a teacher to have. This applies especially to the pacing of a lesson. When I teach, I stay mindful of this and pace myself accordingly, periodically including long gaps in my speech. I repeat myself often and reword critical statements to emphasize their importance. This provides students time to write what I have written on the board as well as important things that I say. Moreover, this allows students to pay better attention to what I am saying without having to be writing frantically just to keep up with my lesson. I realized how effective this can be after a professor of mine employed this manner of teaching. My notes from his courses were succinct and light, full of important annotations. I remember being amazed at how much easier it was to follow his lessons simply because he paused, and repeated himself.

I believe practice is a necessary part of learning. So much of understanding mathematics comes from recognizing patterns which, in turn, comes from experience. To that end, I think graded assignments should be frequent, yet manageable. Short, weekly assignments allow students to get continual practice with course material as well as providing me with valuable feedback on my effectiveness, and highlights areas where I should put more focus on. I believe the majority of the final grade should rest with these assignments. This encourages students to keep up with course work, provides an opportunity for failure and subsequent redemption, and relieves the overwhelming stress of exams.

I have a strong passion for mathematics and learning. Teaching allows me to express this passion and showcase its beauty and subtlety to others. Moreover, teaching motivates me to constantly improve myself and continue to learn. Many teachers have helped shape my passion, confidence, and ability. I am very proud to continue that tradition so that I may help others achieve their full potential.

2 Teaching Résumé

The following pages contain my teaching résumé. In lieu of an empty page, please enjoy these ducks.



I hope you enjoyed the ducks. If you did not, please scroll up and try again.

Mike Verwer

Resumé

Work & Education

Short Resumé

2019-2020 :
2022-Current

Part-Time Professor
ENGINEERING DEPT. · Mohawk
College
Teach math courses in the Engineer-
ing and Business departments.



2022-2023

Part-Time Professor
FACULTY OF LIBERAL ARTS &
SCIENCE · Humber College
Taught Mathematics of Finance



2019-2022

Supply Teacher
SECONDARY SCHOOL · Huron
Perth Catholic District School
Board
Supplied in for various classes.




2016-2018

Teaching Assistant
MATH DEPARTMENT · McMas-
ter University
Wrote solutions for, and graded, as-
signments and tests.




Degrees

2019

Mathematics
M.Sc. · McMaster 
Logic, Universal Algebra



2016

**Mathematics
Statistics**
B.Sc. HONS ·
McMaster 

&



Projects and Development

Talks & Guest Lectures

- June 2019** "On Systems of Projections", at: *McMas-
ter Math Symposium Day* in Hamilton,
ON.
- Mar. 2018** Guest Lecture on the use of SAGE for
graph theory.
- Feb. 2017** Guest Lecturer for 1st year Life Sci. Calc.
at McMaster U.

Professional Development

- 2017** *Principles and Practices of Uni-
versity Teaching*, Development
course by the MacPherson Insti-
tute, Hamilton
- 2025** *Introduction to Data Science in
Python*, Developed by University
of Michigan, via Coursera.org

Projects

- 2019** Contributing Author of: *Calculus: Early transcendentals* (9th ed.). Stewart, J., Clegg, D. K., & Watson, S. (2020). Boston, MA, USA: Cengage Learning. Metricated and provided \LaTeX solutions for the 9th ed. international version.
- 2018** "Real Math (not just numbers)", at: *Holy Name of Mary Catholic Elementary* in St. Marys, ON. Interactive course for gifted elementary school students focusing on exposure to different areas of math.

Teaching

Since the Fall of 2019, I have been a part-time professor at Mohawk College and Humber College. In that time, I have gained an enormous amount of insight, from colleagues and my own practice, into the mechanics of teaching and learning. This extends beyond the classroom into how I approach communicating and interacting with students, both in-person and online. With the constant changing of the teaching landscape, especially after the transitions to and from online schooling, I have incorporated a blended approach to delivery in my teaching. This has taken several forms, from creating engaging online spaces to producing web-based content for my courses. Additionally, my work has improved my skills in the more administrative and planning side of teaching. I have been active in producing assignment problems, grading schemes, and creating course notes for several years now, and my skills in those areas continue to improve.

Teaching Assistantships

During the course of my masters degree I worked as a Teaching Assistant for McMaster University. For several semesters I was a TA for a first year Life Science calculus course. In each semester the course had in the range of 500 to 1,100 students. My duties included marking and invigilating midterm tests, as well as leading review sessions prior to the midterms. I also assisted with a third year Graph Theory class. This was a proof based course, which means that, as assignments, students would be tasked with crafting an argument that would prove or disprove a statement. As a result, the submitted solutions had the potential to vary wildly. I was heavily involved with creating the grading scheme for these assignments in addition to grading them.

Tutoring

As part of my duties as a graduate student at McMaster University, I worked as a tutor in the Math Help Center on campus. This is a service where undergraduates can come and get free tutoring from graduate students in the department of Mathematics and Statistics. As an employee of the Help Center I would work every week tutoring students in material ranging from linear algebra, calculus, number theory and everything in between. Along with providing valuable teaching experience, this kept me up to date and well practiced with material covered in all first year math courses. I have also done free-lance tutoring for the past several years, helping students with math from university and high school as well.

Projects

In 2018 I started, and ran, a program for gifted students at Holy Name of Mary Catholic Elementary School that was intended to showcase interesting areas of math that students would not normally get exposed to until well into post-secondary. The program was highly interactive with each session having students work together to solve various puzzles or exercises. The program was received very favorably by both students and teachers.

In the summer of 2019 I worked with Cengage Learning to convert the 9th edition of James Stewart's *Calculus: Early Transcendentals* to metric. This involved rewriting large portions of the exercises throughout the book, as well as their solutions. This was a very rewarding project from which I gained valuable experience with typesetting and creating diagrams in \LaTeX .

I have developed several Python applications that I use in my classes to demonstrate important mathematical concepts. They can be found on my website (<https://mikeverwer.github.io/programs.html>).



3 Student and Peer Evaluations of Teaching

3.1 Course Evaluation for Math 10042 at Mohawk College, Fall 2019 Term

Fall of 2019 was my first semester teaching at Mohawk College where I taught a section of Math 10042, Math for Computer Studies. The full course evaluation can be found in the Appendices, I will discuss some of the highlights here. In general, my teaching effectiveness was ranked higher than the mean for both my department, and the college as a whole. I scored highest on the responses for; demonstrating enthusiasm for the subject (3.75/5), treating students with respect (3.88/5), and explaining concepts clearly (3.63/5). In particular, all of the students who participated, responded with either Agree or Strongly Agree to the above questions, with most stating Strongly Agree. The subject matter for the course was directly in line with my main area of interest. This allowed me to showcase my expertise as well as provide context and background information on the material. As one student said “[Mike Verwer] explained things with enthusiasm. I enjoyed the side tangents that put what we were learning in context”, and another claiming “He was great at explaining concepts and answering questions”. Overall, the student responses are overwhelming positive, with students having very few criticisms of my teaching.

3.2 Student Feedback on 1LS3 Lesson

After teaching a lesson for the course MATH 1LS3 at McMaster University in the Winter term of 2017, I was able to collect student feedback in the form of an online survey, querying students on their level of satisfaction with my lesson. This survey consisted of five questions, three of which asked students to rate their satisfaction on a scale from 1 - 5, with 1 meaning not at all satisfied and 5 meaning incredibly satisfied. What follows is a breakdown of the quantitative feedback that I received.

As is clear from the figures below, most students appear to have received the lesson very well and almost no students found the lesson unhelpful. Qualitative feedback was also obtained with the only notable request being to improve my handwriting, which I am actively working on.

3.3 Peer Feedback

Along with Student feedback, I was also able to receive feedback on my lesson from several of my peers. Much of the feedback I received was positive and highlighted my efforts to repeat myself, pause, and reiterate the processes that I used in examples:

“I like that you used both the blackboard and slides. You spoke at a good pace and re-iterated your definitions (explained things twice, in different words) and then described them with an example.” ... “I like that you describe what you will be doing before thoroughly working through it.”

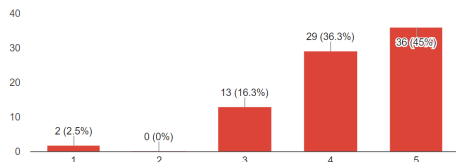
(Samuel Budd, M.Sc. Mathematics)

Feedback also spoke to my ability to reinforce students’ intuitive understanding of concepts like set intersection and limits:

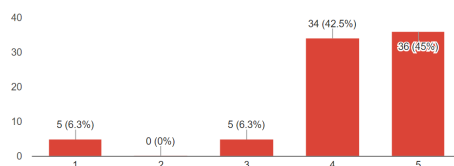
“Instead of simply telling students to “take the intersection”, you drew out a number line and used different colours to show each set; giving a visual representation of what the domain would be. I thought this was an incredibly effective way to teach this topic and it’s something I probably wouldn’t have thought to do.”

(Becky Hooper, M.Sc. Mathematics)

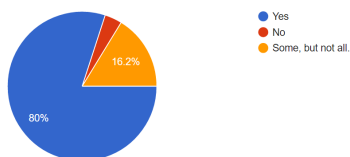
Were you satisfied with the content that I covered today? (80 responses)



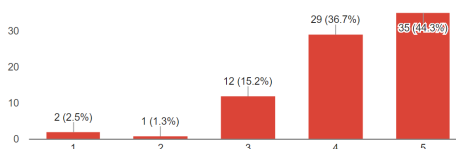
Were you satisfied with how I explained the tutorial content? (80 responses)



Did you find the examples I chose to go through useful? (80 responses)



Compared to other 1LS3 tutorials you have been too, how would you rate this one? (79 responses)



4 Professional Development

2015

During my time as a graduate student at McMaster University I enrolled in a teaching development course called *Principles and Practices of University Teaching*. The course is part of a larger certificate program which is offered by the Paul R. MacPherson Institute for Leadership, Innovation and Excellence in Teaching. The focus was on honing essential pedagogical and practical teaching skills. I learned how to write lesson plans, design a curriculum, strategies for effective teaching, assessment strategies, as well as conduct research on modern pedagogical theory. This course was extremely beneficial to me and I have taken much of what I learned there and applied it to the way I teach and develop lessons. The most important take-away I received was the critical value of describing, to the learner, the intended learning outcomes of each lesson. Not only do ILO's set a precedent of expectations for the learner and the teacher, but they also mentally prepare students for the lesson and allows them the opportunity to know exactly what aspects of the lesson will be the most important.

2025

As the field of data science has continued to be of extreme importance, particularly with the rise of generative AI, I have been actively pursuing courses through Coursera, a leading online learning platform. These courses cover a wide range of topics, including data analysis, machine learning, statistical programming, and data visualization, equipping me with both theoretical knowledge and practical skills. By engaging in these programs, I am not only expanding my technical expertise but also gaining hands-on experience with industry-standard tools and techniques.

5 Personal Projects

As an educator, I believe in leveraging technology to make abstract mathematical concepts more tangible and engaging for students. To this end, I have developed several interactive Python applications that serve as powerful teaching tools, helping students visualize and understand key topics in statistics and number theory. These projects not only demonstrate my technical skills but also reflect my commitment to innovative and effective teaching practices.

Sieve of Eratosthenes Animation

When introducing the concept of prime numbers, I use an animated Python application that visually demonstrates the Sieve of Eratosthenes algorithm. This algorithm efficiently finds prime numbers without relying on division, which is particularly relevant for programming students, as prime verification by division is computationally intensive. The animation helps students grasp the elegance and efficiency of the algorithm, fostering a deeper appreciation for both the mathematical and computational aspects of the topic.

Coin Flip Simulation

To teach the concept of probability as the long-term relative frequency of events, I employ a Python app that simulates flipping coins. The app allows students to specify the number of coins flipped per trial and the total number of trials. It then generates a dot plot showing the number of heads observed in each trial, alongside the corresponding probability distribution. This interactive tool helps students connect theoretical probability with empirical results, reinforcing their understanding through visualization. Importantly, it demonstrates that while the most likely outcome is 50% heads, this exact result rarely occurs in practice. Instead, students observe variability in outcomes, which deepens their understanding of probability and randomness.

Central Limit Theorem Demonstration

One of my most advanced projects is an application that illustrates the Central Limit Theorem. This tool allows users to define an arbitrary probability distribution for a six-sided die, specify the number of dice rolled per trial, and set the number of trials. The app simulates the dice rolls, records the sums, and displays the convolution probability distribution. Each roll is animated, and the resulting dot plot is fully interactive—clicking on any point reveals the specific roll outcomes and their frequencies. The convolution graph instantly updates whenever the die distribution changes or the number of dice rolled per trial increases.

This real-time visual feedback is highly effective at showcasing the statement of the theorem: as the number of dice per trial increases, the distribution of sums becomes more and more normal, even when the underlying die distribution is heavily skewed. This hands-on approach helps students intuitively understand how the Central Limit Theorem applies to real-world scenarios.

These projects not only enhance student engagement but also bridge the gap between theoretical concepts and practical applications. By integrating programming into my teaching, I aim to equip students with both mathematical insight and computational skills, preparing them for the challenges of modern STEM fields.



Appendices

A Teaching Evaluations

A.1 Mohawk College, Math 10042 Fall 2019

The following pages include the full teaching evaluation report for section 7 of Math 10042 which ran during the Fall semester of 2019. The section had a total of 50 students enrolled.

This was the first time I had taught a post-secondary course in it's entirety, and I believe the results speak for themselves. I scored above the department average on most metrics and the qualitative feedback I recieved was very positive.

Fall 2019 PSE Hybrid Course Evaluation Summary Report for Mike Verwer

This report displays results for the hybrid (in-class with/without online components) course evaluation survey that ran for the courses in our full-time day post-secondary (PSE) programs. During the Fall term, most surveys opened on November 19th, and were open until December 15th.

This summary includes:

- *Teacher mean results by question compared to Department, School, and College means.*
- *Demographic breakdowns for the courses that received responses.*
- *Question breakdowns by course.*
- *All open-end responses sorted by course for each question (course name provided for each comment).*

Overall Mean Comparisons with Department, School and College

Overall Teacher Strengths and Areas for Improvement

Strengths		
1	The teacher treats me with respect.	3.88
2	The teacher responds to questions, comments, and/or e-mails in a way that helps me learn.	3.75
3	The teacher demonstrates enthusiasm for the subject.	3.75
Areas for Improvement		
1	The teacher uses active learning techniques (case studies, discussions, group work, projects, labs, scenarios, simulations, etc) to engage me as a learner.	3.29
2	The teacher appears capable with the use of technology.	3.33
3	The teacher incorporates real life examples that are connected to the course content.	3.38

Overall, the teacher was effective at helping me learn.

Question	Teacher (Mike Verwer (000822263))	Department (Building Construction, Electrical and Energy)	School (Engineering Technology)	College
	Mean	Mean	Mean	Mean
Overall, the teacher was effective at helping me learn.	3.78	3.41	3.44	3.52

Teaching Effectiveness

Question	Teacher (Mike Verwer (000822263))	Department (Building Construction, Electrical and Energy)	School (Engineering Technology)	College
	Mean	Mean	Mean	Mean
The teacher appears to be prepared for class.	3.50	3.48	3.51	3.58
The teacher speaks clearly.	3.50	3.46	3.44	3.55
The teacher explains concepts and ideas clearly.	3.63	3.29	3.33	3.42
The teacher manages classroom behaviour to create a positive learning environment.	3.63	3.46	3.47	3.51
The teacher responds to questions, comments, and/or e-mails in a way that helps me learn.	3.75	3.42	3.42	3.47
The teacher is accessible outside of class (by appointment, email, etc).	3.43	3.47	3.47	3.50
The teacher incorporates real life examples that are connected to the course content.	3.38	3.43	3.42	3.52
The teacher makes criteria for grading assessments (tests, assignments, projects, etc) clear in advance.	3.63	3.42	3.39	3.44
The teacher provides feedback on assessments (tests, assignments, projects, etc) in an agreed upon timeframe.	3.38	3.39	3.37	3.43
The teacher uses active learning techniques (case studies, discussions, group work, projects, labs, scenarios, simulations, etc) to engage me as a learner.	3.29	3.29	3.31	3.42
The teacher appears capable with the use of technology.	3.33	3.50	3.53	3.54
The teacher demonstrates enthusiasm for the subject.	3.75	3.52	3.51	3.57
The teacher treats me with respect.	3.88	3.64	3.61	3.63

Overall, the course was structured in a way that helped me to learn the course material.

Question	Teacher (Mike Verwer (000822263))	Department (Building Construction, Electrical and Energy)	School (Engineering Technology)	College
	Mean	Mean	Mean	Mean
Overall, the course was structured in a way that helped me to learn the course material.	3.08	3.29	3.23	3.35

Course Delivery

Question	Teacher (Mike Verwer (000822263))	Department (Building Construction, Electrical and Energy)	School (Engineering Technology)	College
	Mean	Mean	Mean	Mean
The course materials available (textbook, courseware, equipment, etc) are important to achieving learning outcomes.	2.78	3.30	3.26	3.36
The eLearn activities (content, discussions, quizzes, self-assessments, etc) in this course help me learn.	3.42	3.30	3.27	3.34
Additional web resources (videos, articles, web pages) outside of eLearn in this course help me learn.	3.52	3.19	3.25	3.31
The ratio of time spent face-to-face in the classroom and spent on-line is a good mix for this course.	3.45	3.24	3.25	3.34
Assessments (tests, assignments, projects, etc) in this course help to further my understanding of the subject.	3.50	3.31	3.27	3.35
The variety of activities and assessments (tests, assignments, projects, etc) in this course provides options for me to demonstrate my learning.	3.29	3.25	3.24	3.34

Demographic Information on Hybrid Courses Surveyed

Overall Response Rate for Teacher

Raters	Students
Responded	26
Invited	120
Response Ratio	22%

Distribution of Unique CRNs by Course

COURSE_CODE	Count	Percentage
MATH-10042	1	100%

Distribution of Unique CRNs by Campus

CAMPUS	Count	Percentage
FF	1	100%

Note: Unique student numbers below reflect "Submitted/Completed" surveys only.

Distribution of Unique Students who Responded by Campus

PROG_CAMPUS	Count	Percentage
FF	25	100%

Distribution of Unique Students who Responded by Semester

SEMESTER	Count	Percentage
SM01	24	96%
SM04	1	4%

Distribution of Unique Students who Responded by Program

PROGRAM	Count	Percentage
555 - CST-Ntwrk Eng&Sec Analyst(C)	11	44%
559 - CS Technology-Software Devlpt	9	36%
447 - C.S. Tn -Ntwk Sys NonCo-op	2	8%
558 - C.S.Techn.-Software Supp -CoOp	2	8%
455 - C.S. Tn - Ntwk Sys Co-op	1	4%

Results by Course

NOTES:

1. Results include both completed and saved responses (students started survey but didn't finish all questions or didn't submit the survey).
2. All hybrid courses surveyed that received NO responses were removed from the tables.
3. Students who opted-out of a course survey could still provide feedback on the overall questions.
4. Individual question response numbers that are less than the number of overall course responses indicates that students either opted out of the survey or skipped the question and did not complete the survey.
5. "Not Applicable" responses are included in these calculations.
6. Hover over the column headings to see the full column titles.

Opt In / Opt Out

CRS	Resp	%(OptIn)	#(OptIn)	#(OptOut)
Overall	26	96%	25	1
MATH-10042	26	96%	25	1

Overall, the teacher was effective at helping me learn.

CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	25	36%	16	3.78	28%	8%	0%	0%
MATH-10042	25	36%	16	3.78	28%	8%	0%	0%

Teaching Effectiveness

The teacher appears to be prepared for class.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	33%	16	3.50	17%	17%	0%	0%
MATH-10042	24	33%	16	3.50	17%	17%	0%	0%
The teacher speaks clearly.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	33%	16	3.50	17%	17%	0%	0%
MATH-10042	24	33%	16	3.50	17%	17%	0%	0%

The teacher explains concepts and ideas clearly.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	33%	16	3.63	21%	13%	0%	0%
MATH-10042	24	33%	16	3.63	21%	13%	0%	0%
The teacher manages classroom behaviour to create a positive learning environment.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	33%	16	3.63	21%	13%	0%	0%
MATH-10042	24	33%	16	3.63	21%	13%	0%	0%
The teacher responds to questions, comments, and/or e-mails in a way that helps me learn.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	33%	16	3.75	25%	8%	0%	0%
MATH-10042	24	33%	16	3.75	25%	8%	0%	0%
The teacher is accessible outside of class (by appointment, email, etc).								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	25%	17	3.43	17%	8%	4%	0%
MATH-10042	24	25%	17	3.43	17%	8%	4%	0%
The teacher incorporates real life examples that are connected to the course content.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	29%	16	3.38	17%	13%	4%	0%
MATH-10042	24	29%	16	3.38	17%	13%	4%	0%
The teacher makes criteria for grading assessments (tests, assignments, projects, etc) clear in advance.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	29%	16	3.63	25%	4%	4%	0%
MATH-10042	24	29%	16	3.63	25%	4%	4%	0%
The teacher provides feedback on assessments (tests, assignments, projects, etc) in an agreed upon timeframe.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	29%	16	3.38	21%	8%	0%	4%
MATH-10042	24	29%	16	3.38	21%	8%	0%	4%
The teacher uses active learning techniques (case studies, discussions, group work, projects, labs, scenarios, simulations, etc) to engage me as a learner.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	25%	17	3.29	13%	13%	4%	0%
MATH-10042	24	25%	17	3.29	13%	13%	4%	0%
The teacher appears capable with the use of technology.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	25%	18	3.33	8%	17%	0%	0%
MATH-10042	24	25%	18	3.33	8%	17%	0%	0%
The teacher demonstrates enthusiasm for the subject.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	33%	16	3.75	25%	8%	0%	0%
MATH-10042	24	33%	16	3.75	25%	8%	0%	0%
The teacher treats me with respect.								
CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	33%	16	3.88	29%	4%	0%	0%
MATH-10042	24	33%	16	3.88	29%	4%	0%	0%

Overall, the course was structured in a way that helped me to learn the course material.

CRS	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	79%	0	3.08	38%	42%	13%	8%
MATH-10042	24	79%	0	3.08	38%	42%	13%	8%

Course Delivery

The course materials available (textbook, courseware, equipment, etc) are important to achieving learning outcomes.								
COURSE_CODE	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	54%	1	2.78	33%	21%	29%	13%
MATH-10042	24	54%	1	2.78	33%	21%	29%	13%
The eLearn activities (content, discussions, quizzes, self-assessments, etc) in this course help me learn.								
COURSE_CODE	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	88%	0	3.42	63%	25%	4%	8%
MATH-10042	24	88%	0	3.42	63%	25%	4%	8%
Additional web resources (videos, articles, web pages) outside of eLearn in this course help me learn.								
COURSE_CODE	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	92%	1	3.52	58%	33%	0%	4%
MATH-10042	24	92%	1	3.52	58%	33%	0%	4%
The ratio of time spent face-to-face in the classroom and spent on-line is a good mix for this course.								
COURSE_CODE	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	79%	2	3.45	58%	21%	8%	4%
MATH-10042	24	79%	2	3.45	58%	21%	8%	4%
Assessments (tests, assignments, projects, etc) in this course help to further my understanding of the subject.								
COURSE_CODE	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	88%	0	3.50	63%	25%	13%	0%
MATH-10042	24	88%	0	3.50	63%	25%	13%	0%
The variety of activities and assessments (tests, assignments, projects, etc) in this course provides options for me to demonstrate my learning.								
COURSE_CODE	Resp	SAA%	#NA	Mean	SA%	A%	D%	SD%
Overall	24	83%	0	3.29	50%	33%	13%	4%
MATH-10042	24	83%	0	3.29	50%	33%	13%	4%

Open-Ended Question Comments

Note: To organize comments by course code, simply copy all of the comments and paste into excel or word, then sort all the comments.

What did the teacher do well?

Comments
Math for Computer Studies - Mike Verwer: Alek was my professor
Math for Computer Studies - Mike Verwer: Explained things with enthusiasm. I enjoyed the side tangents that put what we were learning in context.
Math for Computer Studies - Mike Verwer: N/A
Math for Computer Studies - Mike Verwer: I don't know Mike Verwer so I don't know if he did well. I can't any comments about him.
Math for Computer Studies - Mike Verwer: He was great at explaining concepts and answering questions.
Math for Computer Studies - Mike Verwer: He explained maths concepts clearly
Math for Computer Studies - Mike Verwer: N/a
Math for Computer Studies - Mike Verwer: Clear delivery of information and good pacing
Math for Computer Studies - Mike Verwer: he was very well prepared for the concepts of teaching intricate concepts of maths
Math for Computer Studies - Mike Verwer: Mike Verwer was not this class's teacher at any point

What could the teacher do to better support your learning?

Comments
Math for Computer Studies - Mike Verwer: Alek was my professor
Math for Computer Studies - Mike Verwer: I thought he did really well with some very dry material.
Math for Computer Studies - Mike Verwer: N/A
Math for Computer Studies - Mike Verwer: I don't know because I don't know him.
Math for Computer Studies - Mike Verwer: He's good.
Math for Computer Studies - Mike Verwer: He always seems nervous or anxious to face the class.
Math for Computer Studies - Mike Verwer: N/a
Math for Computer Studies - Mike Verwer: Nothing
Math for Computer Studies - Mike Verwer: Mike Verwer was not this class's teacher at any point

What did you like MOST about this course?

Comments
Math for Computer Studies - Mike Verwer: I liked how I was introduced to new ways of doing math and figuring out complex problems.
Math for Computer Studies - Mike Verwer: Gave me more confidence with math. Never really liked it before.
Math for Computer Studies - Mike Verwer: I liked everthing in this course starting from the course delivery to the teacher to the resources that we had in class. I did my best in Math even If I failed Math I would choose this teacher to teach me again.
Math for Computer Studies - Mike Verwer: It was fun and not complicated.
Math for Computer Studies - Mike Verwer: K–maps and Aleks as our teacher
Math for Computer Studies - Mike Verwer: NOTHING!!!!!!! I HATE MATHS
Math for Computer Studies - Mike Verwer: How easy it was.
Math for Computer Studies - Mike Verwer: Math
Math for Computer Studies - Mike Verwer: was easy
Math for Computer Studies - Mike Verwer: The amount of time spent online and in class is a good mixture
Math for Computer Studies - Mike Verwer: The Prof.
Math for Computer Studies - Mike Verwer: it was a very nice course
Math for Computer Studies - Mike Verwer: The professor was very knowledgeable and friendly

What did you like LEAST about this course?

Comments
Math for Computer Studies - Mike Verwer: Math is a subject I wasnt really strong with, it's a course that I struggled with because of how the course is laid out
Math for Computer Studies - Mike Verwer: There wasn't a lot of material re: why we're learning these things. Solving for x and rearranging boolean expressions is fun once you get the hang of it, but why are we learning it? What's the historical perspective? What's this have to do with programming? Why is this important? I read up on this a bit on my own but found it hard to find good places to start because they're's so much info. I think putting a little more emphasis on this sort of thing would make math more accessible, especially for the people who don't get off on just rearranging equations.
Math for Computer Studies - Mike Verwer: too easy
Math for Computer Studies - Mike Verwer: Hard to review if you're out of school for quite a while.
Math for Computer Studies - Mike Verwer: There is nothing that I liked the least about the course. Everything was perfect and again I thank Mohawk College for bringing this teacher to teach us Math.
Math for Computer Studies - Mike Verwer: Nothing.
Math for Computer Studies - Mike Verwer: Algebra..... and how we are rushing through the curriculum without fully understanding the topic..
Math for Computer Studies - Mike Verwer: Nothing
Math for Computer Studies - Mike Verwer: The lack of elearning resources. He should have recommended some videos or math channels. He should also do in class practice tests and taking them up.
Math for Computer Studies - Mike Verwer: too easy
Math for Computer Studies - Mike Verwer: structure of the material and when we learn which topics
Math for Computer Studies - Mike Verwer: the lecture timings of the course were quite early
Math for Computer Studies - Mike Verwer: The course had minimal useful e–learn resources. It was recommended to youtube concepts we didn't fully understand, however youtube often provided something very different than the topic suggested.
It would be greatly beneficial if e–learn was used for this course by the department heads to upload full lessons so we can re–watch a lesson if we didn't fully get it the first time, or missed a class.
Math is the study of understanding rules and strategy, I was always an A – A+ math student, this semester I'm far from it. If you didn't catch the rules the first time, you won't be able to develop a strategy by jumping into practice problems. It is similar to suggest if a carpenter doesn't know how to use a tape measure, practice eyeballing sizes would be highly successful and they build your addition to your house.



B Samples of Work

The following pages contain a course syllabus, assessment, and assessment evaluation framework that I produced for a first year exposure course which I designed. The goal of the course is to briefly introduce students to a variety of different topics in discrete and pure math. This exposure is valuable since many students at this level have only seen math that involves continuous functions and polynomials. By taking this course, students may discover an interest mathematical topics that they never knew existed and may even lead them to pursue a degree in the field.

The grading scheme for formative assessments, as discussed in the syllabus, works under the concept of a “difficulty quota”. Questions are ranked on a 3-point scale of difficulty, 0-star, 1-star, and 2-star. Each assignment will have a mixture of questions in all three difficulties. Each 0-star question must be answered, from there students may choose any question they like but must meet a required star count. This allows students to choose to either do few, but challenging questions; or many, simpler questions. By assessing in this manner, students who have difficulty with the course material aren’t punished for a lack of understanding, but rather encouraged to practice their fundamentals; whereas students with a high level of understanding can challenge themselves with more thought provoking exercises.

B.1 Syllabus

Generic University - Course Syllabus Department of Mathematics MATH C0D3: Introduction to Discrete Math Winter Semester 2018

Class Meeting Information: Mon. Wed. Fri. 10:30am -11:30am HH 301

Tutorial Information: Tuesday 2:30pm - 3:20pm HH 301

Instructor: Michael Verwer

Contact Information:: mike.verwer@gmail.com

Office Hours:: Tue. Wed. 13:30-14:30

Prerequisites:

Enrollment in Mathematics Program, or instructor approval.

Course Description:

This course is designed to provide an exposure to some areas of discrete mathematics, such as combinatorics, graph theory, and group theory as well as provide an introduction to proof methods.

Course Format:

Three, one hour lectures per week. Weekly Assignments, two midterms, final exam.

Course Intended Learning Outcomes:

By the end of this course, students should be able to:

1. Understand basic proof methods such as induction and contradiction.
2. Understand the basics of counting, the factorial and binomial functions.
3. Know what a graph is, as well as understand the notions of subgraphs and types of graphs.
4. Know the axioms of a group, as well as understand the concepts of a subgroup, cyclic group, and group of symmetries.

Required Course Materials and Fees:

There will be two textbooks for the course:

1. *Discrete Mathematics and Its Applications* by Kenneth H. Rosen 7th ed.
2. *Contemporary Abstract Algebra* by Joseph Gallian 7th ed.

Course Assessments:

Assessment	Date (subject to change)	Weight
Assignments	Weekly (Assigned on Friday, due the following Friday)	45%
Midterm 1	Feb. 6	15%
Midterm 2	Mar. 12	15%
Final Exam	TBD	25%

Assignments:

This course will have weekly assignments, except for the midterm weeks. Assignments will be given on Fridays and will be due the following Friday. Each assignment will have a certain number of problems of varying difficulty; each difficulty level being a zero-star, one-star, two-star, etc. All zero-star problems must be completed. From there, you have a certain “star quota” to fill. A one-star problem is worth one star and a two-star problem is worth two. This gives you the choice of doing more, simpler problems; or fewer, difficult problems; depending on your comfort level with the material.

The total weight of all assignments will be 45%. At the end of term, your worst assignment grade will be dropped. Assignments will be due by 11:59 PM every Friday and to be submitted in the drop box in the basement of HH. Due to the frequency, late assignments will not be accepted unless an extension has been granted at least 24 hours before the due date.

Midterms:

There will be two, 50 minute midterms, each worth 15%. They will not be cumulative (i.e. the second midterm will only cover the material discussed AFTER the first midterm). More information will be provided closer to the respective dates.

Final:

The final exam will cover all material discussed in class. It will be worth 25%. More detailed information will be presented closer to the date.

Course Schedule:

At certain points in the course it may make good sense to modify the schedule outlined below. The instructor reserves the right to modify elements of the course and will notify students accordingly (in class and post any changes to the course website).

Weeks 1-3 Introduction to Mathematical Logic

- Conversion of English sentences to propositional statements and vice versa
- Introduction to Proof methods: Induction, Contradiction

Weeks 4-6 Combinatorics

- Factorials, counting
- Binomial relations
- Permutations/combinations

Weeks 7-9 Graph Theory

- Definition of a graph, subgraph
- Types of graphs. eg: path, tree, cycle, bipartite
- Pigeon-hole principle, Handshaking principle
- Euler/Hamiltonian paths/graphs

Weeks 10-12 Group Theory

- Symmetries and Permutations
- Group Axioms
- Familiar example and modular arithmetic
- Finite groups and subgroups, Cayley tables

Policy on Missed Course Work, Extensions, and Late Penalties:

Assignments will be due by 11:59 PM every Friday and to be submitted in the drop box in the basement of HH. Due to the frequency, late assignments will not be accepted and given a grade of 0 unless an extension has been granted at least 24 hours before the due date. An extension can be requested in person or via e-mail.

Other Relevant Policy Statements:

Academic Integrity:

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at www.genericu.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Academic Accommodation of Students With Disabilities: Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-5259140 ext. 28652 or e-mail sas@genericu.ca. For further information, consult Generic University's Policy for Academic Accommodation of Students with Disabilities.

Accommodation for Religious, Indigenous, and Spiritual Observances: Students requiring academic accommodation based on religion, indigenous and spiritual observances should follow the procedures laid out in Generic University's Policy on Academic Accommodation for Religious, Indigenous, and Spiritual Observances.

On-line Elements (if applicable): This course will use Avenue to Learn as the course website. All Assignments and relevant course information will be posted there.

B.2 Sample Assignment and Solution

MATH C0D3 Assignment 1: Star Quota - 3

Assigned: January 12, 2023 Due: January 19, 2023

1. Write the negation of each of these propositions. Your answer should have the negation distributed, if there are subpropositions. **0-Star** (4 marks)
 - (a) Mei has an MP3 player.
 - (b) There is no pollution in New Jersey.
 - (c) $2 + 1 = 3$.
 - (d) The summer in Maine is hot and sunny.
 - (e) I will have coffee and a treat.
2. Write the negation of each of these propositions. **(1-Star)** (4 marks)
 - (a) Jennifer and Teja have *always* been friends.
 - (b) *Every* baker's dozen contains 13 items.
 - (c) *Every* day, Abby sends more than 100 text messages.
 - (d) *There is a* elephant that is pink.
3. Let p and q be the propositions "The votes have been counted." and "The election is decided.", respectively. Express each of these compound propositions as an English sentence.
 - (a) $\neg p \wedge q$ **(1-Star)** (4 marks)
 - (b) $\neg p \rightarrow q$
 - (c) $p \leftrightarrow q$
 - (d) $\neg q \vee (\neg q \wedge p)$
4. Determine (with justification) whether each of these conditional statements is true or false.
 - (a) If $1 + 1 = 2$, then $2 + 2 = 5$. **(1-Star)** (4 marks)
 - (b) If $1 + 1 = 3$, then $2 + 2 = 4$.
 - (c) If $1 + 1 = 3$, then $2 + 2 = 5$.
 - (d) If $2 + 2 = 4$, then $1 + 1 = 2$.
5. Prove, without using a truth table, that $(p \vee \neg q) \wedge (q \vee \neg r) \wedge (r \vee \neg q)$ is true whenever p, q , and r all have the same truth value, and false otherwise. **(2-Star)** (8 marks)

MATH 1DL3 Assignment 1 Solutions:

Star Quota - 3

1. Write the negation of each of these propositions. Your answer should have the negation distributed, if there are subpropositions. **0-Star** (4 marks)

(a) Mei has an MP3 player.
 Mei does not have an MP3 player.

(b) There is no pollution in New Jersey.
 There is pollution in New Jersey.

(c) $2 + 1 = 3$.
 $2 + 1 \neq 3$.

(d) The summer in Maine is hot and sunny.
 The summer in Maine is NOT hot OR it is NOT sunny.

(e) I will have coffee and a treat.
 I will NOT have coffee AND I will NOT have a treat.

1 mark per correct (equivalent) answer.

2. Write the negation of each of these propositions **(1-Star)** (4 marks)

(a) Jennifer and Teja have *always* been friends.
There was a time when Jennifer and Teja were not friends.

(b) *Every* baker's dozen contains 13 items.
There is at least one baker's dozen that does not have 13 items.

(c) *Every* day, Abby sends more than 100 text messages.
There was a day where Abby did not send 100 text messages.

(d) *There is at least one* elephant that is pink.
Every elephant is not pink.

1 mark per correct answer. 1/2 mark if equivalent answer but the principles $\neg\forall p \equiv \exists\neg p$ and $\neg\exists q \equiv \forall\neg q$ were not used.

3. Let p and q be the propositions "The votes have been counted." and "The election is decided.", respectively. Express each of these compound propositions as an English sentence.

a) $\neg p \wedge q$ **(1-Star)** (4 marks)
 The election is not decided and the votes have been counted.

b) $\neg p \rightarrow q$
 If the votes have not been counted, then the election is decided.

c) $p \leftrightarrow q$
 The election is decided if and only if the votes have been counted.

d) $\neg q \vee (\neg p \wedge q)$
 The votes have not been counted, OR the election is not decided and the votes have been counted.

1 mark per correct answer.

4. Determine (with justification) whether each of these conditional statements is true or false.

a) If $1 + 1 = 2$, then $2 + 2 = 5$.

(1-Star) (4 marks)

FALSE: $1+1=2$ is True, but $2+2=5$ is False, so the whole statement is False.

b) If $1 + 1 = 3$, then $2 + 2 = 4$.

TRUE: Since $1+1=3$ is False, the statement is True regardless of the conclusion.

c) If $1 + 1 = 3$, then $2 + 2 = 5$.

TRUE: Since $1+1=3$ is False, the statement is True regardless of the conclusion.

d) If $2 + 2 = 4$, then $1 + 1 = 2$.

TRUE: Since $2 + 2 = 4$ is True, and $1 + 1 = 2$ is True, the entire statement is True.

1 mark per correct answer and justification, 1/2 mark if just correct answer.

5. Prove, without using a truth table, that $(p \vee \neg q) \wedge (q \vee \neg r) \wedge (r \vee \neg p)$ is true whenever p, q , and r all have the same truth value, and false otherwise. **(2-Star)** (8 marks)

If p, q, r have the same truth value, then we can replace all instances of q or r with p .^{*} So we can turn the statement into $(p \vee \neg p) \wedge (p \vee \neg p) \wedge (p \vee \neg p)$.^{**} Now, $(p \vee \neg p)$ is always *TRUE*. So now the statement reads $(\text{TRUE}) \wedge (\text{TRUE}) \wedge (\text{TRUE})$ which is always *TRUE*.^{***}

^{*} 4 marks for equivalent reasoning. ^{**} 2 marks for equivalent reasoning. ^{***} 2 marks for equivalent reasoning.