

MATH156: Writing and Communication in Mathematics

Course Instructors: Vivek Tewary, Sayantan Datta

Course Schedule: Wednesday, 4:30 - 06:20 PM

Classroom:

Office Hours: By appointment (*Office hours schedules will be updated after the drop period*)

Course description: Writing and communication are fundamental to mathematics as to any other discipline. This course explores writing and communicating mathematics in two distinct but related registers: technical and non-technical writing. The first register discusses how to convey mathematical ideas and proofs to a technically trained audience, while the second register investigates how science journalists engage with mathematics in order to convey the same to a wider readership. In the course, students will read and listen to exemplary pieces of mathematical writing and communication in order to derive principles of professional mathematics writing and communication and implement the same in their own work.

Course objectives/Learning outcomes: Through this course, students will gain an insight into various aspects of technical and non-technical mathematics writing. Further, this course will also equip students to think about writing in an audience-driven manner. This course also aims to demonstrate the cross-talk between different kinds of mathematics writing.

Pre-requisite courses, if any: None

Attendance: Your presence is important to the class. We show respect to each other by being in class on time and not missing classes. Therefore, this course will follow the university policy on attendance. A minimum of 75% attendance is required to pass the course, except under exceptional circumstances (*please consult the university policy for more details*).

Under unavoidable circumstances, if you must miss a session, please inform the instructor before the class by writing an email.

Incomplete Grades: This is granted only under exceptional circumstances and when students have completed at least 75% of the assessment till end of term. This is granted upon mutual agreement between the instructors.

Supplementary Examinations: The course will follow university guidelines with regard to supplementary examinations.

Academic Integrity: It is important that we always do our work ourselves and acknowledge help when we have had some. Learning how to cite sources correctly (and this course will teach you how to do that) will help you avoid plagiarism. Our integrity as scholars is how we say that we take our work

seriously. Intentional plagiarism (despite repeated reminders from the instructor) will result in having to repeat the course.

Use of generative AI is allowed **only** when assigned by the instructors.

Work required: Since this is a course in writing and communication, please expect to be reading, writing, reviewing and rewriting both in class and as take-home assignments. Due to the cumulative nature of this course, we cannot accommodate requests for shifting due dates; it is imperative that you complete all the work on time, and *the instructors will not accept any late submissions*. Even when the instructors do grant an extension to the agreed upon due dates, they may not be able to provide extensive feedback on the submissions.

If you are unable to stick to the due dates in the case of an emergency, please contact either of your instructors immediately.

Workshop Pedagogy: This course is hands-on, collaborative and peer driven. Student participation and input will be central to the functioning of the course. The instructors will facilitate class activities that will include group work and individually directed exercises in comprehension, drafting and reviewing. Students can expect group discussions and oral presentations to be an integral part of class work.

Sample Class Material:

(Please note that all readings are tentative and subject to change. All readings will be provided.)

Mandatory Reading:

- 1) “Recounting the Rationals” by Neil Calkin and Herbert S. Wilf (2000, *The American Mathematical Monthly*). URL :
<https://www2.math.upenn.edu/~wilf/website/recounting.pdf>.
- 2) “An Inequality Related to the Isoperimetric Inequality” by Lynn H. Loomis and Hassler Whitney (1949, *Bulletin of the American Mathematical Society*). URL:
<https://www.ams.org/journals/bull/1949-55-10/S0002-9904-1949-09320-5/S0002-9904-1949-09320-5.pdf>.
- 3) “The Endpoint Case of the Bennett-Carbery-Tao Multilinear Kakeya Conjecture.” by Larry Guth (2010, *Acta Mathematica*). URL:
<https://link.springer.com/article/10.1007/s11511-010-0055-6>
- 4) “The Pursuit of Beauty” by Alec Wilkinson (2015, *The New Yorker*). URL:
<https://www.newyorker.com/magazine/2015/02/02/pursuit-beauty>.
- 5) “Are Science Journalists Scientists?” by Mukunth Vasudevan (2023, *The Hindu*). URL:
<https://www.thehindu.com/opinion/op-ed/are-science-journalists-scientists/article67049526.ece>.

Suggested Reading:

- 1) “A Most Profound Math Problem” by Alexander Nazaryan (2013, *The New Yorker*). URL: <https://www.newyorker.com/tech/annals-of-technology/a-most-profound-math-problem>.
- 2) “He Dropped Out to Become a Poet. Now He’s Won a Fields Medal” by Jordana Cepelowicz (2022, *Quanta Magazine*). URL: <https://www.quantamagazine.org/june-huh-high-school-dropout-wins-the-fields-medal-2022-0705/>.
- 3) “What is Mathematics?” by Alec Wilkinson (2021, *The New Yorker*). URL: <https://www.newyorker.com/culture/culture-desk/what-is-mathematics>.
- 4) “Is Mathematics Real?” by Vasudevan Mukunth (2021, *Root Privileges*). URL: <https://rootprivileges.net/2021/11/28/is-mathematics-real/>.
- 5) “With Snowflakes and Unicorns, Marina Ratner and Maryam Mirzakhani Explored a Universe in Motion” by Amie Wilkinson (2017, *The New York Times*). URL: <https://www.nytimes.com/2017/08/07/science/women-mathematicians-maryam-mirzakhani-marina-ratner.html>.
- 6) “On Proof and Progress in Mathematics” by William P. Thurston (1994, *Bulletin of the American Mathematical Society*). URL: <https://www.math.toronto.edu/mccann/199/thurston.pdf>.
- 7) “Pointwise Convergence of Fourier Series” by Paul R. Chernoff (1980, *The American Mathematical Monthly*). URL : <https://www.tandfonline.com/doi/abs/10.1080/00029890.1980.11995049>.
- 8) “Piecewise Polynomials and the Finite Element Method” by Gilbert Strang (1973, *Bulletin of the American Mathematical Society*). URL: <https://www.ams.org/journals/bull/1973-79-06/S0002-9904-1973-13351-8/S0002-9904-1973-13351-8.pdf>.
- 9) “Eigenvectors from Eigenvectors : A Survey of a Basic Identity in Linear Algebra” by Peter B. Denton, Stephen J. Parke, Terence Tao, and Xining Zhang (2022, *Bulletin of the American Mathematical Society*). URL: <https://www.ams.org/journals/bull/2022-59-01/S0273-0979-2021-01722-8/S0273-0979-2021-01722-8.pdf>.

Work Schedule (T2, 2023):

(This is a tentative schedule and is subject to change)

Week	Topics	Assignments <i>(This column lists the due dates and the submission dates of all major assignments in the course.)</i>	Instructor

1	Introduction to the course		Prof. Vivek Tewary
	Reading mathematics		
2	Writing a math article (Part I)	Assignment 1 Pre-Rough Draft Assigned	Prof. Vivek Tewary
3	Writing a math article (Part II)		Prof. Vivek Tewary
4	Best practices in technical math writing	Assignment 1 Pre-Rough Draft Due	Prof. Vivek Tewary
5	Working with LaTeX	Assignment 1 Rough Draft Assigned	Prof. Vivek Tewary
6	Figures, graphs, diagrams and tables	Assignment 1 Rough Draft Due	Prof. Sayantan Datta Prof. Vivek Tewary
		Peer-Review Assigned	
7	Introduction to (math) journalism	Peer-Review Due	Prof. Sayantan Datta
		Assignment 1 Final Draft Assigned	
8	Reporting and interviewing	Assignment 2 Interview Sheet and Rough Draft Assigned	Prof. Sayantan Datta
9	Elements of exposition: Analogies	Assignment 2 Interview Sheet and Rough Draft Due	Prof. Sayantan Datta
		Editorial Review Assigned	
10	Writing like a journalist	Editorial Review Due	Prof. Sayantan Datta
11	Narrating like a	Assignment 2 Final	Prof. Sayantan Datta

	journalist	Draft Assigned	
12 (Exam Week)		Assignment 1 Final Draft Due	
		Assignment 2 Final Draft Due	

Assessment Scheme:

Assignment Type	Components	Weightage
Low-Stakes Assignments	Instructors will assign low-stakes assignments from time to time to gauge students' progress in the course. These may include (but are not limited to) worksheets, class presentations, response sheets, etc. One low-stake assignment that will run throughout the course involves reading and responding to readings curated by the instructors via the Canvas Discussion Board. These readings may include texts from the suggested reading list.	30%
Assignment 1: Writing Mathematics for a Technical Audience	Pre-Rough Draft (5%)	35%
	Rough Draft (10%)	
	Peer-Review (5%)	
	Final Draft (15%)	
Assignment 2: Writing Mathematics for a Non-Technical Audience	Interview Sheet + Rough Draft (15%)	35%
	Editorial Review (5%)	

	Final Draft (15%)	
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Krea-SIAS Scoring Rubric:

Grade point	Score range (%)	Letter grade	
10	98-100	A+	Outstanding
9.6	95-97	A	Excellent
9.2	90-94	A-	Excellent
8.7	85-89	B+	Proficient
8.2	80-84	B	Proficient
7.7	75-79	B-	Proficient
7.2	70-74	C+	Satisfactory
6.7	65-69	C	Satisfactory
6.2	60-64	D	Satisfactory
5.5	50-59	E	Satisfactory
0	0-49	U	Unsatisfactory