

Conrad Grebel University College
University of Waterloo
PACS 302 Special Topics: Math for Good and Evil
Syllabus: Winter 2021

Instructor: Judith Koeller (they/them, she/her)

On-line Meet Times: Tuesday, 9:30-10:30 am Eastern time; see Learn for access

Office Hours: Thursdays, 9:30-10:30 am Eastern time; see Learn for access

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Acknowledgment:

The University of Waterloo is on the traditional territory of the Attiwandaron (Neutral), Aniashinaabe, Haudenosaunee peoples. The University of Waterloo is situated on the Haldimand Tract, the land promised to the Six Nations that includes ten kilometers on each side of the Grand River.

Course Description:

This course is built on the conviction that the kinds of problems mathematicians and computer scientists seek to address, and the ways they address them, should matter for anyone interested in advancing peace in the world. The peace implications of math and computer science are explored in connection to topics such as wealth, democracy, policing, oppression, environment, and health. Students engage with the material through reading, writing and discussion and are not asked to do any computation. This course is designed for students from all faculties and levels of comfort (or discomfort) with math.

Math and computer science are tools of enormous and increasing power that impact our daily lives in thousands of ways that we seldom recognize. Many of the ways that these disciplines have affected us are very beneficial and have transformed the lives of millions of people for the better. Increasingly, however, mathematics and computer science are used in ways that may cause harm and inequity.

Without peace studies understanding how math can be appropriately harnessed for good, peace theory will be inadequate to prepare students for the twenty-first century. Without peace principles being considered when math is used to accomplish technological objectives, math can instead cause harm. Therefore, those studying and using math need to also understand and apply peace theory.

Your Safety, Remote Learning and Academic Freedom:

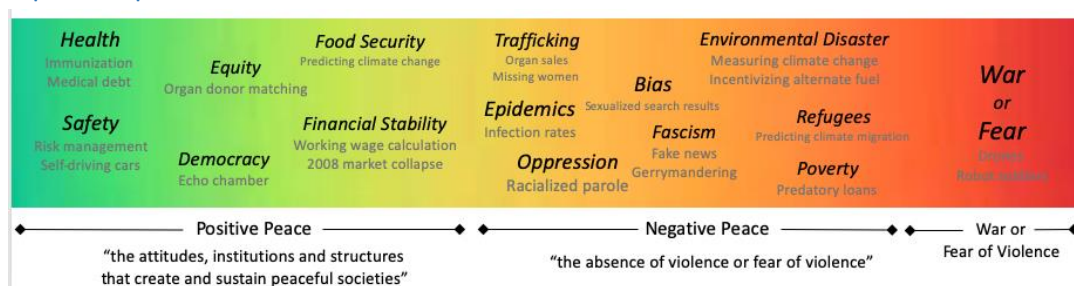
This course will engage a number of important themes about resistance, violence, oppression and whistleblowing that seek to shift power. If this course were offered in a classroom in Waterloo we would be in the safety of democratic society, and a university that enables academic freedoms of inquiry, debate and communication of ideas that may be suppressed in other settings. Many but not all of the examples are set in North America. As this is a course offered remotely and you (the students) are studying in places around the world I ask that you follow your own discretion in engaging with the course materials. Please consider how taking this course and having its materials on your computer might impact your safety. If you ever believe that having the course materials on your computer puts you at risk, please contact me and we will work towards suitable alternatives.

Learning Objectives:

Students who complete this course will be able to:

- (Peace objectives):
 - Describe the complexity of peace beyond the simple absence of violence.
 - Envision and describe how math and computer science can be leveraged to better serve the interests of society.
 - Articulate the potential of collaborations between peace studies and mathematics to benefit society.
- (Math objectives):
 - Articulate a multiplicity of ways that math can be used to benefit society or cause harm.
 - Evaluate the peace implications of specific mathematical work.
 - Articulate strategies for ethical dilemmas related to work in math or computer science.

Concept Map:



Text Description: there is a continuum from war or the fear of war, to Negative Peace (the absence of violence or fear of violence), to Positive Peace (the attitudes, institutions and structures that create and sustain peaceful societies). Positive Peace is associated with health, safety, democracy, food security and financial stability, while trafficking, epidemics, oppression, bias, fascism, environmental disaster and poverty characterize Negative Peace. For each of these examples, mathematics plays a role in fostering or inhibiting peace.

Course teaching methodology:

This course will emphasize reading, reflection and discussion. It will not assume that there is one "right" answer to questions posed or issues discussed, but rather that there are ways of thinking that will enable students to develop their own personal viewpoints. This course assumes that we all learn best and internalize lessons most effectively in a process of dialogue with each other. Students must therefore personally wrestle with concepts discussed in order to benefit from the course. Teaching methodologies that will be used will include:

- Assigned readings and videos
- Videos and on-line discussions by course instructor and some guest presenters
- Small group discussions

On-line Meet times:

This course will meet on-line each Tuesday from 9:30-10:30 am Eastern time, to interact with your instructor and fellow class-mates, discussing the week's materials and trying interactive materials. The meetings will be helpful in processing the readings and in deepening your understanding of the themes in preparation for the weekly Topic Reflection assignments. Being known by your instructor can be beneficial, such as if you aspire to attend graduate school. The on-line meetings will be recorded and posted on Learn. There are no marks directly associated with attending, and no penalty for not attending.

Web Page:

This course will use a WATERLOO LEARN website. This site will provide general information for the course, video and reading assignments, writing prompts, grades for assignments, and other matters that may be posted from time-to-time. Important announcements such as the cancellation of class will also be posted there, so please check the site before each class, just in case.

Required Books:

Students will write a book report from an approved list of books. You must either purchase the book in time or access it through the university library or another library, if available.

Course Evaluation and Assignments:

On-line Quizzes (40% of course mark) – due weeks 1 - 10, Tuesdays at 9:30 am Eastern time in Learn. Watch assigned videos (about 30 minutes per week). Read assigned reading (about 50 pages per week, including many news articles). All videos and readings can be found in Perusall (accessed via Learn). Complete ten quizzes on the videos and readings. The quiz questions ask direct questions about details in the readings and videos – they are not meant to be “trick questions” and there is no computation. You can refer to the readings and videos while taking the quiz. The top eight of ten quizzes are counted. Quizzes will be available on Learn for any 90 minute period in the week before the due date.

Topic Reflections (28% of course mark) – due weeks 1-4 and 6-10, Thursdays at 9:30 am Eastern time in Crowdmark. Using a writing prompt available on Learn, write a 250 word (one page) personal reflection on some aspect of the weekly theme to respond to the readings and videos. The top seven of nine will be counted. Include at least one quote from a reading/video; no research is required beyond the assigned readings/videos. Reflections are intended to take no more than 30 minutes to write. Reflections will be graded generously if they indicate a reasonable amount of engagement with the videos/readings. No make-up assignments will be given.

Book Review (12% of course mark) – due February 25, 2021 at 9:30 am EST in Crowdmark. Write a review approximately 1,000 words long (4 pages) on a book from the Book Review List. Other books consistent with course themes may be considered if permission from the instructor is granted before February 9, 2021. No more than three students may complete a review of the same book; the signup sheet to select a book is accessible through LEARN. Students are responsible for purchasing the book in time, or accessing it through the university library or another library. Detailed instructions, the book list and sign-up sheet, the marking rubric and an exemplar book review have been posted to Learn.

Media Report (20% of course mark) – due April 15, 2021 at 9:30 am EDT in Crowdmark. Choose a book, video or news article related to a real-world issue involving both math and peace. Find at least four other sources related to the same issue. Write a report with main body approximately 1,500 to 2,00 words (6 to 8 pages) on the issue. Explore its stakeholders and peace implications. Detailed instructions, the marking rubric and a list of over 175 related news articles are available to Learn, along with exemplars from a similar assignment.

Discussion Posts (bonus up to 5%) The assigned readings and videos in Perusall include discussion questions that allow you to comment and to respond to your classmates. For each **quality** annotation on Perusall (as determined by me), you will receive a 0.5% credit towards your final grade, up to a maximum of 5% (10 contributions). Your contribution to Perusall must be sufficiently different from other contributions by your peers, and your ideas must be clear and well-supported.

Submission guidelines

All quizzes are to be completed in Learn. All written assignments are to be submitted by the due date to Crowdmark (www.crowdmark.com). See Learn for details on submitting to Crowdmark. If there is a Crowdmark outage at an assignment deadline, email your assignment to the instructor immediately as proof that you completed it on time.

Late assignments

Assignments must be submitted when due. Late assignments will be deducted 2% per day. Please be in touch with a course instructor at least 24 hours PRIOR to the assignment due date if there is legitimate need for accommodation. If you are ill, please communicate as quickly as you are able. A medical note may be required for an accommodation.

UWaterloo Policies

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility.
Arts: [Academic Integrity website](#) University of Waterloo: [Academic Integrity Office](#)

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. [Check [the Office of Academic Integrity](#) for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to [Policy 71, Student Discipline](#). For typical penalties, check [Guidelines for the Assessment of Penalties](#).

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70, Student Petitions and Grievances, Section 4](#) When in doubt, please be certain to contact the department’s administrative assistant who will provide further assistance.

Appeals: A decision made or penalty imposed under [Policy 70, Student Petitions and Grievances](#) (other than a petition) or [Policy 71, Student Discipline](#) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to [Policy 72, Student Appeals](#).

Accommodation for students with Disabilities: [AccessAbility Services](#), located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with [AccessAbility Services](#) at the beginning of each academic term.

Other sources of information for students:

Mental Health Support: All of us need a support system. The faculty and staff in Arts encourage students to seek out mental health support if they are needed.

On Campus

- Counselling Services: counselling.services@uwaterloo.ca / 519-888-4567 ext. 32655
- **MATES:** one-to-one peer support program offered by Federation of Students (FEDS) and Counselling Services
- Health Services Emergency service: located across the creek from Student Life Centre

Off campus, 24/7

- **Good2Talk:** Free confidential help line for post-secondary students. Phone: 1-866-925-5454
- Grand River Hospital: Emergency care for mental health crisis. Phone: 519-749-4300 ext. 6880
- **Here 24/7:** Mental Health and Crisis Service Team. Phone: 1-844-437-3247
- **OK2BME:** set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

Full details can be found online on the Faculty of Arts [website](#)

Download [UWaterloo and regional mental health resources \(PDF\)](#)

Download the [WatSafe app](#) to your phone to quickly access mental health support information

Accommodation for Illness: A medical certificate presented in support of an official petition for relief from normal academic requirements must provide all of the information requested on the “University of Waterloo Verification of Illness” form or it will not be accepted. More information can be obtained from Health Services and the form is available in pdf: <https://uwaterloo.ca/health-services/student-medical-clinic/services/verification-illness>

The Writing Centre: Writing Centre staff offer one-on-one support in planning assignments and presentations, using and documenting research, organizing and structuring papers, and revising for clarity and coherence. Make an appointment or drop in at the Library for quick questions or feedback. To book a 50-minute appointment and to see drop-in hours, visit www.uwaterloo.ca/writing-centre

Weekly Schedule

The following schedule may change from time-to-time to reflect the pace of class discussion. Any changes will be announced in class at least a week in advance, with announcements on LEARN.

*All due dates before March 15 are 9:30 am EST; all due dates after March 15 are 9:30 am EDT.

Date	Week #	Topic	Quiz (in Learn)	Topic Reflection (in Crowdmark)
Jan. 12	0	Course Introduction		
Jan. 19	1	Intro to the field of Math	Q1 due Jan 19	TR1 due Jan 21
Jan. 26	2	Intro to the field of Peace Studies	Q2 due Jan 26	TR2 due Jan 28
Feb. 2	3	Ethics and Whistleblowing	Q3 due Feb 2	TR3 due Feb 4
Feb. 9	4	Wealth and Poverty	Q4 due Feb 9	TR4 due Feb 11
Feb. 16	Reading Week, no class			
Feb. 23	5	Environment	Q5 due Feb 23	Book Review due Feb 25 (no Topic Reflection)
March 2	6	Health	Q6 due March 2	TR6 due March 4
March 9	7	Equity, Bias and Oppression	Q7 due March 9	TR7 due March 11
March 16	Pause, no class			
March 23	8	Democracy and Politics	Q8 due March 23	TR8 due March 25
March 30	9	Modelling and Social Change	Q9 due March 30	TR9 due April 1
Apr. 6	10	Policing and the Justice System	Q10 due April 6	TR10 due April 8
Apr. 13	No class			Media Report due April 15