Conrad Grebel University College / University of Waterloo

PACS 315: Engineering and Peace

Fall 2021 (rev. 20 September 2021)

Class Time:	Wednesdays, 6:30-7:50 PM
Location:	Room 1208, Conrad Grebel University College

Instructor:	Paul Heidebrecht
Phone:	519-885-0220 Ext. 24225
Email:	pheidebr@uwaterloo.ca (best way to reach me)
Office Hours:	Book an online meeting weekdays between 8:30 AM – 4:30 PM via Calendly

Territorial Acknowledgment:

This class meets on the traditional territory of the Attawandaron (also known as Neutral), Anishnaabeg, and Haudenosaunee peoples. Conrad Grebel University College and the Univerity of Waterloo are situated on the Haldimand Tract, the land promised to the Six Nations that includes 10 kilometers on each side of the Grand River. Please read Grebel's full land acknowledgement for additional context.

COVID-19 Guidelines for In-person Classes:

1. Everyone must submit proof of vaccination in accordance with University of Waterloo regulations, with rare and specific exceptions that require rapid antigen testing.
2. Everyone must complete the COVID-19 screening questions using the Campus Check-In tool before arriving on campus, and must not attend class if experiencing any COVID-19 symptoms.
3. Everyone must wear a face covering while on campus.
4. Everyone must maintain physical distance (2-metres apart) while outside of instructional spaces. This guideline will also be observed within room 1208.
5. All course materials will be provided through online means.

Please consult the University of Waterloo COVID-19 Information website for the most up-to-date information on guidelines.

Contingency Plans:

In the event of the short or longer term cancellation of in-person classes at the University of Waterloo, this class will meet synchronously at the regularly scheduled time via Zoom (passcode: 3bZ8vc). If a student is going to miss a class due to illness or because they are required to self-isolate due to COVID-19 protocols, they should contact their instructor as soon as possible.

Course Description:

This course is built on the conviction that the kinds of problems engineers seek to address, and the ways they seek to address them, should matter for anyone interested in advancing peace in the world. Topics include: historical connections between the discipline of engineering and warfare, understanding the engineering method and mindset, and technological frontiers for peacebuilding.

Course Description, continued:

Intended to test the foundational assumption of the University of Waterloo's Peace and Conflict Studies program—that peace is everybody's business—initial offerings of this course verified that PACS has something important to offer to the field of engineering, and that engineering as a discipline has something important to contribute to the advancement of peace. This course is also intended to encourage and equip students to tackle pressing social challenges through other curricular (e.g., Capstone Design or Senior Research projects) and co-curricular (e.g., co-op work terms or entrepreneurship programming) offerings at Waterloo.

Course Learning Outcomes:

By the end of the term, students should be able to:

1. clearly articulate why peace is the business of engineers;
2. augment their approach to analyzing and solving problems with insights from both engineering and peacebuilding theory and practice;
3. convince non-engineers that engineers can contribute to building sustainable peace; and
4. identify opportunities to apply their expertise and passions to make a meaningful social impact.

Course Delivery:

This course is being offered in a hybrid or blended format, combining elements of the asynchronous online version delivered in 2020, and the fully in-person versions delivered in 2019 and prior years. Each weekly module includes the following five required learning events:

Mode	#	Event	Description	Estimated Time
Online Preparation	1	Required Reading	Read and comment on an assigned article, report, or book excerpt via Perusall	30-60 minutes
	2	Supplemental Resource	Watch a video, listen to a podcast, or review website content	30-60 minutes
	3	Guest Interview	Watch a pre-recorded video interview with an engineer and/or peacebuilder	30 minutes
In-person Class	4	Check-in	Engage with the instructor on the required reading, supplemental resource, and guest interview for the week, as well as previous in-class assignments	20 minutes
	5	Assignment	Complete an assigned exercise or task and submit required outputs via LEARN	60 minutes

Course Assessment:

#	Element	Weight	Due Date
1	In-class Assignments	50% (best 10 of 12 x 5% each)	Weekly
2	Course Engagement	30%	Various
3	Final Exam	20%	December 17

Additional Course Assessment Instructions:

(i) In-class Assignments

Every weekly module will include an assignment that will require students to complete an exercise or task related to the topic of the week. This will be a major component of student evaluation, and detailed instructions will be provided for each individual assignment. Required outputs must be submitted via LEARN by the end of each class on Wednesdays at 7:50 PM; late assignments will NOT be accepted. The assessment rubric is as follows:

60% – Met the minimum expectations for the assignment
75% – Demonstrated a meaningful level of engagement with the assignment
90% – Made a contribution that went above and beyond expectations

(ii) Course Engagement

Assessment of course engagement will utilize a specifications grading approach. Each activity is graded pass/fail, and the overall grade for course engagement will be based on the number of levels that students complete successfully. Late submissions will not be accepted unless negotiated in advance.

Course Engagement Levels	Grade	Due Date
Level 1: Required reading engagement ▪ Post good questions, comments, and responses on Perusall by noon before class each Wednesday; an average Perusall score of 1.0 or higher is required to achieve this level.	60%	Weekly until Dec. 1
Level 2: Level 1 + all class surveys completed ▪ Provide feedback on course topics, readings, guests, and assignments via three surveys posted on LEARN.	70%	Sep. 29, Oct. 27, Nov. 17
Level 3: Levels 1 & 2 + participation in one campus or community event ▪ Submit a report via LEARN on a campus or community event attended that contributes to at least one of the learning outcomes for this course.	80%	By Dec. 1
Level 4: Levels 1, 2 & 3 + extended reading ▪ Read one of the books listed in the "Extended Reading Bibliography" at the end of this syllabus and complete a virtual book review discussion with your professor.	90%	By Dec. 8
Level 5: Levels 1, 2, 3 & 4 + publication ▪ Publish an opinion piece, news article, or blog post in an on-campus or community media outlet that in some way addresses the question: "Why is peace the business of engineers?"	100%	By Dec. 17

(iii) Final Exam

This class will conclude with a take-home final exam distributed on December 1; answers must be submitted via LEARN by the end of the day on December 17. The exam will be composed of essay questions that provide the opportunity to demonstrate your own knowledge of the topics and readings encountered throughout this course, and insights you have gleaned from guest interviews and assignments. Evaluation will also be based on the overall presentation and organization of your answer, including sentence structure and mechanics.

Additional UWaterloo Course 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. See the Office of Academic Integrity webpage for more information.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for their actions. 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 professor or the PACS Graduate Studies Coordinator. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses 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 PACS Graduate Studies Coordinator 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 they have a ground for an appeal should refer to Policy 72 - Student Appeals.

Accommodation for Students with Disabilities:

The AccessAbility Services office, 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 the AS office at the start of each academic term.

Mental Health Support:

All of us need a support system. The faculty and staff at Conrad Grebel University College and the University of Waterloo encourage students to seek out mental health supports 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 the Waterloo Undergraduate Student Association (WUSA) 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: 519-749-433 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

Download UWaterloo and regional mental health resources (PDF) and the WatSafe app to quickly access mental health support information.

Course Schedule:

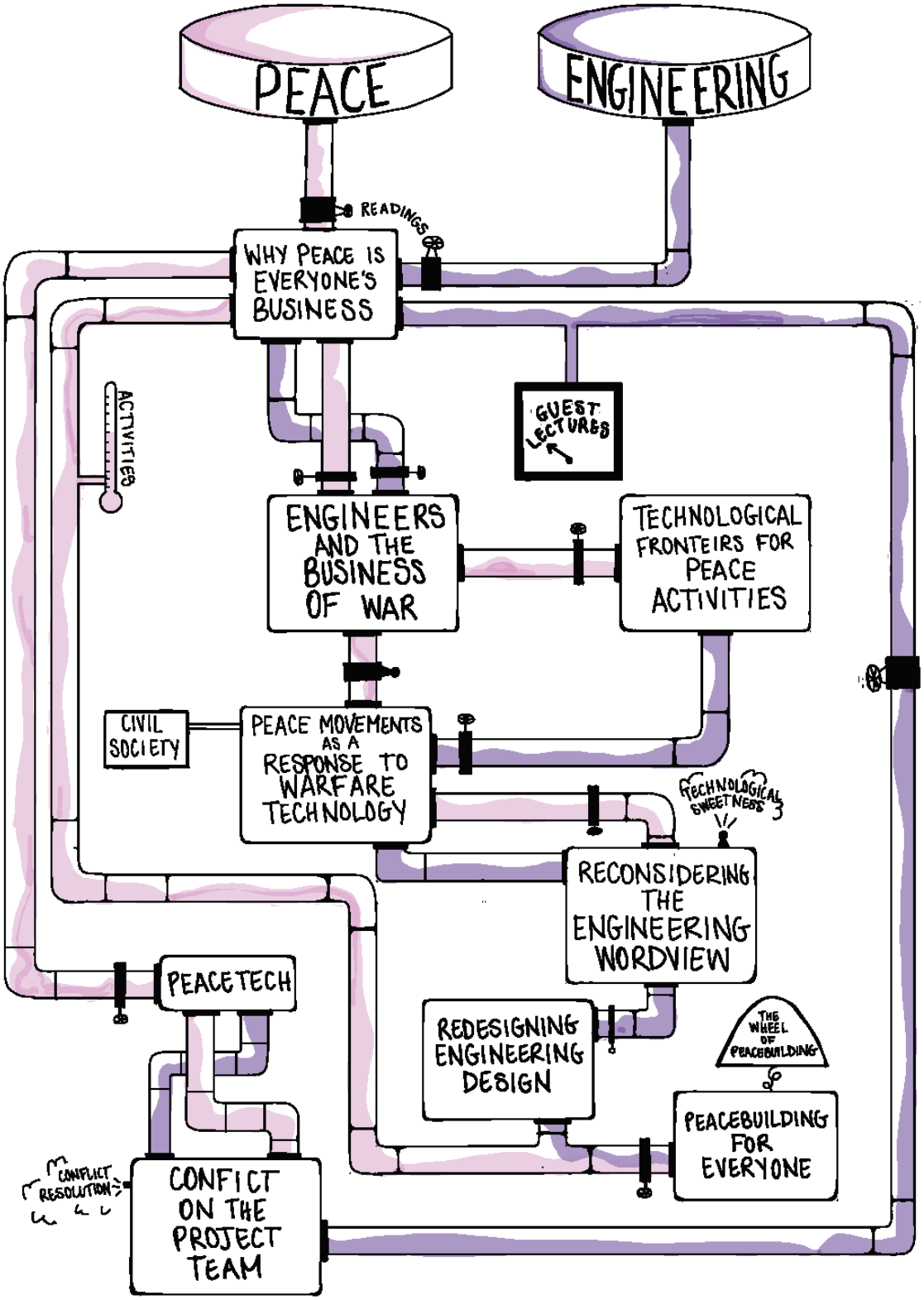
The following schedule will be updated on an ongoing basis to fill gaps in required readings, supplemental resources, and guest interviews. All updates will be posted in advance on LEARN and Perusall.

Week	Date	Topic	Online Preparation			Notes
			Required Reading	Supplemental Resource	Guest Interview	
1	Sep. 8	Course introduction: Why peace is everybody's business	Course syllabus	N/a	N/a	
2	Sep. 15	Why has war been the business of so many engineers?	Nieusma and Blue, "Engineering and War"	Blank, "Hidden in Plain Sight"	Mike Peasgood	
3	Sep. 22	Peace movements as a response to changes in the technology of warfare	Article 36, "Some Key Issues in Humanitarian Disarmament"	Üzümcü, "Nobel Lecture"	Branka Marijan	
4	Sep. 29	Technological frontiers for peace activists	JustPeace Labs, "Technology in Conflict"	Ban Lethal Autonomous Weapons, "Slaughterbots"	Lisa Schirch	Survey #1 due
5	Oct. 6	Reconsidering the engineering worldview	Koen, "Engineering Method"; Petroski, "The Value of Failure"	Engineering Change Lab, "Principles of Technological Stewardship"	Mark Abbott	
-	*Oct. 11-15*	*Thanksgiving Day holiday and Reading Week*				
6	Oct. 20	Reconsidering the engineering worldview, continued	Douglas, "The Bitter Aftertaste of Technical Sweetness"; Gambetta and Hertog, "Uncivil Engineers"	Gladwell, "The Bomber Mafia"	Sheldon Fernandez	
7	Oct. 27	Revisiting engineering design	Hartley, "The Fuzzie and the Techie"	Burnett, "Designing Your Life"	Kerstin Dautenhahn	Survey #2 due
8	Nov. 3	Peacebuilding for people who aren't peacebuilding professionals	Docherty and Lantz-Simmons, "What is Old is New Again"	Institute for Economics & Peace, "Global Peace Index 2021"	Austin Choi-Fitzpatrick	

Course Schedule, continued:

Week	Date	Topic	Class Preparation			Notes
			Required Reading	**Supplemental Resource**	**Guest Interview**	
9	Nov. 10	The technological underpinnings of positive peace	Meier, "The Rise of Digital Humanitarians"	TBD	Bruce Taylor	
10	Nov. 17	PeaceTech	Choi-Fitzpatrick, "Drones for Good"	TBD	Althea Middleton-Detzner	Survey #3 due
11	Nov. 24	Conflict on the project team	TBD	Kutch, "What productive conflict can offer a workplace"	TBD	
12	Dec. 1	Engineers as social innovators	Riley, "We've Been Framed!"	Canadian Grand Engineering Challenges	Jeremy Showalter	Last day for campus or community event report
-	Dec. 8	N/a	N/a	N/a	N/a	Last day for Extended Reading discussion
-	Dec. 17	N/a	N/a	N/a	N/a	Final Exam due; last day for publication

Course Concept Map:



By Katherine Walker (PACS 315 class of 2020)

Required Reading Bibliography:

Article 36. "Some Key Issues in Humanitarian Disarmament." October, 2013.

Choi-Fitzpatrick, Austin. "Drones for Good: Technological Innovations, Social Movements, and the State." *Journal of International Affairs* 68/1 (Fall/Winter 2014): 19-36.

Docherty, Jane, and Mikhala Lantz-Simmons. "What is Old is New Again." Journal 1 in *A Genealogy of Ideas*. Centre for Justice and Peacebuilding, 2016.

Douglas, Heather E. "The Bitter Aftertaste of Technical Sweetness." In *Frankenstein: Annotated for Scientists, Engineers, and Creators of All Kinds*, by Mary Shelley, edited by David H. Guston, Ed Finn, and Jason Scott Robert, 247-52. Cambridge: The MIT Press, 2017.

Gambetta, Diego, and Steffen Hertog. "Uncivil Engineers: The Surprising Link Between Education and Jihad." *Foreign Affairs* (10 March 2016).

Hartley, Scott. "The Fuzzie and the Techie: Why the Liberal Arts Will Rule the Digital World." *Stanford Social Innovation Review* (25 April 2017).

JustPeace Labs. "Technology in Conflict: Conflict Sensitivity for the Tech Industry." 2020.

Koen, Billy Vaughn. "Engineering Method," in *Encyclopedia of Science, Technology, and Ethics*, ed. Carl Mitcham, 635-37. Detroit: Macmillan Reference USA/Thomson Gale, 2005.

Meier, Patrick. "The Rise of Digital Humanitarians," chapter 1 in *Digital Humanitarians: How Big Data Is Changing the Face of Humanitarian Response*, 1-23. Boca Raton, FL: CRC Press, 2015.

Nieusma, Dean, and Ethan Blue. "Engineering and War." *International Journal of Engineering, Social Justice, and Peace* 1/1 (Spring 2012): 50-62.

Petroski, Henry. "The Value of Failure." *Duke Divinity School Faith & Leadership Blog* (16 May 2011).

Riley, Donna. "We've Been Framed! Ends, Means, and the Ethics of the Grand(iose) Challenges." *International Journal of Engineering, Social Justice, and Peace* 1/2 (Fall 2012): 123-26.

Supplemental Resources:

Ban Lethal Autonomous Weapons. "Slaughterbots" [video]. 12 November 2017.

Blank, Steve. "Hidden in Plain Sight: The Secret History of Silicon Valley" [video]. 2008.

Burnett, Bill. "Designing Your Life" [video]. TEDxStanford, 19 May 2017.

Canadian Grand Engineering Challenges (2020-2030): Inspiring Action to Improve Life for Canadians and the World [report]. February 2020.

Engineering Change Lab. "Principles of Technological Stewardship for the Engineering Community" [slideshow]. July 2019.

Gladwell, Malcolm. "The Bomber Mafia" [podcast]. *Revisionist History*, 9 July 2020.

Institute for Economics & Peace, "Global Peace Index 2021: Measuring Peace in a Complex World" [report]. June, 2021.

Kutch, Jess. "What productive conflict can offer a workplace" [video]. TED2019, April 2019.

Üzümcü, Ahmet. "Nobel Lecture" on behalf of the Organisation for the Prohibition of Chemical Weapons [video]. Oslo, Norway, 10 December 2013.

Extended Reading Bibliography:

Benjamin, Ruha. *Race After Technology: Abolitionist Tools for the New Jim Crow*. Medford, MA: Polity Press, 2019.

Choi-Fitzpatrick, Austin. *The Good Drone: How Social Movements Democratize Surveillance*. Cambridge, MA: The MIT Press, 2019. [Available through MIT Press Open Access]

Daub, Adrian. *What Tech Calls Thinking: An Inquiry Into the Intellectual Bedrock of Silicon Valley*. New York: Farrar, Straus and Giroux, 2020.

Gambetta, Diego, and Steffen Hertog. *Engineers of Jihad: The Curious Connection Between Violent Extremism and Education*. Princeton: Princeton University Press, 2016.

Gladwell, Malcolm. *The Bomber Mafia: A Dream, a Temptation, and the Longest Night of the Second World War*. Boston: Little, Brown and Company, 2021.

Hartley, Scott. *The Fuzzy and the Techie: Why the Liberal Arts Will Rule the Digital World*. New York: Houghton Mifflin Harcourt, 2017.

Koen, Billy Vaughn. *Discussion of the Method: Conducting the Engineer's Approach to Problem Solving*. New York: Oxford University Press, 2003.

Lederach, John Paul. *The Moral Imagination: The Art and Soul of Building Peace*. New York: Oxford University Press, 2005.

Meier, Patrick. *Digital Humanitarians: How Big Data Is Changing the Face of Humanitarian Response*. Boca Raton, FL: CRC Press, 2015.

O'Mara, Margaret. *The Code: Silicon Valley and the Remaking of America*. New York: Penguin Press, 2019.

Petroski, Henry. *To Forgive Design: Understanding Failure*. Cambridge, MA: Belknap Press, 2012.

Singer, Peter W. *Wired for War: The Robotics Revolution and 21st Century Conflict*. New York: Penguin, 2009.

Smith, Brad, and Carol Ann Browne. *Tools and Weapons: The Promise and the Peril of the Digital Age*. New York: Penguin, 2019.

Srinivasan, Ramesh. *Beyond the Valley: How Innovators Around the World Are Overcoming Inequality and Creating the Technologies of Tomorrow*. Cambridge, MA: The MIT Press, 2019.

Wiener, Anna. *Uncanny Valley: A Memoir*. New York: MCD, 2020.

[Unless otherwise noted, print or online editions of all books are available from the UWaterloo Library]