# CISC 4/667 (011): Computing for Social Good

**Spring 2021, Time:** MWF 2:30-3:20 PM (EST) [https://udel.zoom.us/j/94578881746]

**Instructor:** Matthew L. Mauriello (mlm@udel.edu)

**Office Hours:** Wed 10-11 AM (EST) or by appointment (<https://udel.zoom.us/j/98349144291>)

**Communications:** Piazza (<https://piazza.com/class/kjuiq03w2yg105>) or email

**Location:** Virtual (<https://udel.zoom.us/j/94578881746>)

*Note: Passcodes for Zoom meeting will be sent by email or posted to Piazza*

## Introduction:

As the influence of computer science and technology has grown, from punch cards and vacuum tubes to laptops and mobile phones to concerns about pervasive AI and social media influencing our political landscapes, so has the desire to leverage these advances for the good of society. This seminar will explore the broad, ongoing themes around *Computing for Social Good*, inclusive of advances in Human-Computer Interaction (HCI), the Internet-of-Things, Artificial Intelligence, and the myriad areas that they influence in our modern society. We will read about national- and global-scale challenges, specific subproblems, and relevant technology systems. While we will examine some conventional engineering ethics topics, our aim is much broader: we will start with fundamental social and ecological challenges and then consider what role, if any, technology should play in responding to them. One of our aims will be to differentiate between technology solutions that sound good and those that have a chance for real impact. As a result, we will take a systems perspective—to trace root causes and find the right place(s) to make lasting change.

While a working knowledge of critical technology theory is important to doing good work, this is a class for builders and designers. Content will include paper discussions and seminar talks from leading experts whose work complements class discourse. All students will: (i) complete a term project that involves designing or building an artifact such as a tool for solving a real-world problem that they bring to the class, (ii) iteratively develop a fictional narrative elucidating the potentials and dangers of new ongoing advances, (iii) write an informative blogpost on a selected topic to be shared on the course website, (iv) and participate in regular class discussions. Finally, students will deliver a final presentation and writeup about their work.

**Clarifications & Prerequisites:** While this course has both an undergraduate and graduate section, expectations will be similar for all students. Students are expected to have completed an introductory course on software engineering; at the University of Delaware this is CISC 275.

**Required Books & Materials:** In leu of a traditional textbook, students are asked to register for a virtual conference day at CHI2021. Once final online registration details are [posted](https://chi2021.acm.org/for-attendees), we will discuss if this remains reasonable and mitigating strategies if not. All other materials for participating in class will be provided. If students find their term-project is restricted by the availability of resources, they are asked to reach out regarding available support. While there is no guaranteed availability, acquiring low-cost hardware, running experiments on Amazon Mechanical Turk or conducting paid online surveys may be possible.

*This course draws inspiration from several sources including courses like it. See the references below.*

## Grading:

**Term Project (50%):** Projects that address some pressing social need will be proposed by teams of 1 – 3 students. All teams will eventually need to produce an artifact: a program, model, system, or design for a solution to the selected problem. Projects must also be interactive in some way (i.e., to allow for user feedback). Projects will be iteratively developed over the course of the semester with days set aside for in-class discussion and peer feedback. You are free to select any problem you can make strong argument for being related to the theme of the seminar. Submission requirements are as followed:

* Project Pitch – All students will submit a project pitch.
* Revised Project Pitch – Project teams will submit a revised project pitch.
* Literature Review – Project teams will survey literature and competitive products (as applicable)
* GitHub Repository – Project teams will submit a well-documented GitHub (e.g., Code, Readme).
* Final Presentation – Project teams will give a final presentation on their completed artifact.
* Project Paper – Project teams will submit a final paper in the form of a [CHI LBW](https://chi2021.acm.org/for-authors/chi-publication-formats); you are welcome to use either the Overleaf or Word templates, but the submitted PDF must conform to prescribed format for the submission type.

**Writing Assignments (25%):** There will be several short writing and oral presentation exercises throughout the quarter including the writing of a speculative fiction where each person must imagine a world where a future technology leads to both utopian and dystopian outcomes and the writing of a blog post where you will practice ethical argumentation.

* Speculative Design Fiction
* Speculative Design Fiction Revised
* Ethics Blog Post

**Reading Writeups (10%):** A two-paragraph (minimum) post that sums up the selected readings in your own words and describes what you, as a reader, found interesting about the topic or work. It would also be helpful to offer a brief critique and post any questions you have about the work would be helpful for us to discuss during class. This means you will need to post all writeups on Piazza under the thread corresponding to the selected reading by 11:59 PM (EST) on the evening prior to class:

<https://piazza.com/class/kjuiq03w2yg105>

*This will be used to give direction to discussion leaders. Late policy: 50% deducted for all late submissions unless permission by the instructor is granted beforehand.*

**In-class Participation (15%):** Each student will be asked to present a topic (15 minutes) and lead a discussion of the required paper (25 minutes) plus a brief rundown on any optional materials. The days with “Lecturer” highlighted in blue on the class schedule below are the ones available. The scheduling of these should be done by **11:59 PM on February 19th** by completing the scheduling form with your top three choices in a rank ordered list:

<https://forms.gle/ThaBJ52ZgVHkM5AS6>

## Final Project:

**Initial project ideas (1-page) are due (via email to Instructor) by February 24th. You are strongly encouraged to think about possible project ideas before the start of classes!**

1. What is the title of your project idea?
2. What is the problem you are trying to solve?
3. What are some existing solutions (lightweight related work)?
4. What is your design/solution?
5. What resources do you need to be successful?

**More detailed project proposals are due by March 8th.**

Once project teams are assigned, you should meet outside of class as soon as possible to extend your search of the literature, discuss the initial proposal paying attention to the novelty/impact/fit of the proposed solution, and extend it in such a way that it seems feasible given the time and exciting to the team. You should, together, provide an updated and detailed proposal. The general format is a 2–4-page academic-style paper detailing any updates on your initial proposal:

1. Who is on your team and what are their primary responsibilities?
2. What is the problem you are trying to solve?
3. What are some existing solutions (extended related work & competitive analysis)?
4. What is your design/solution? How is it different from existing solutions?
5. What technologies are you leveraging to build your design/solution?
6. How do you plan (or hope) to evaluate your design/solution?
7. What is your collaboration plan? When will you meet as a team and how will you work?
8. A general timeline for tasks over the semester to the deadline of May 26th; timeline should reflect in-class review sessions outlined on the schedule.

*After the initial proposal and grouping stages, the instructor will be scheduling meetings with project teams to discuss the details further (to help with setting expectations, acquiring resources, etc.).*

**Final Project Presentations:**

Your projects are due Monday, May 26th. Projects will be presented during the final exam period and final papers will be due at 11:59pm that evening.

1. An 8-page writeup in the CHI 2021 Late-Breaking Work format. This document should look very similar to the papers included in the class: Abstract, Introduction, Related Work, Content, Discussion, Conclusion, and supporting Tables/Figures. The quality and formatting of this document will count as part of the goal of this exercise is to practice communicating as a professional researcher.
2. A 15-minute presentation on your team’s project and progress throughout the quarter. Should review the project pitch, provide an overview of related work, describe how you evaluated your solution and what the key findings work, and describe next steps. Should be well-supported by visual content (i.e., Figures, Tables, Diagrams, and/or Video). A robust 5-minute discussion of the project, inclusive of the perspectives shared in the class, will then follow.

## Course Policies

**Academic Integrity.** Please familiarize yourself with UD policies regarding academic dishonesty. To falsify the results of one’s research, steal the words or ideas of another, cheat on an assignment, re-submit the same assignment for different classes, or allow or assist another to commit these acts corrupts the educational process. Students are expected to do their own work and neither give nor receive unauthorized assistance. Penalties for violating these policies will be severe. Complete details of academic integrity policy can be found at: <http://www1.udel.edu/studentconduct/policyref.html>

**Statement on Inclusiveness.** The instructional staff supports the University of Delaware’s commitment to creating a campus free of discrimination based on race, color, religion, sex, national origin, age, disability, sexual orientation, gender identity, or veteran status. We further affirm the importance of cultivating an intellectual climate that allows us to better understand the similarities and differences of those who constitute the UD community, as well as the necessity of working against inequalities that may also manifest here as they do in the broader society.

**Late Policy.** Students will be allowed two no-questions-asked extensions for any individual assignment submissions during the semester. Please let me know via email if you are planning to use your extensions. My preferences would be that assignments are completed within 48 hours, but please include an estimated completion times in your email. This does not apply to group work.

**Excused Absence.** There is not an explicit attendance policy. If you must miss a class, please let me know. Since participating in regular discussions and activities is part of your grade, absences should not be excessive. We will follow the guidelines listed here to determine what counts as an excused absence: <https://catalog.udel.edu/content.php?catoid=40&navoid=6626>

**Communication.** Whenever the need arises, students are encouraged to send direct messages to the instructor via email. Students are also requested to give at least one full business day for a response, though the instructor will try to be prompt. For example, if students are concerned about how they will be evaluated, you are encouraged to ask the instructor as early as possible.

**Accessibility.** UD is committed to providing both physical accessibility and access to information technology resources to individuals with disabilities. Please see this website for further information: <https://www.udel.edu/home/accessibility/>

**Presentations.** As you make materials for class, please make them as accessible as possible. For some tips, please visit: <https://www.youtube.com/watch?v=L9TxhGv91kc>

**Office Hours.** Students are encouraged to attend office hours when possible, even if they have nothing to ask or discuss. Especially in the case of remote teaching, this helps us get to know each other a little better. Think of these as coffee hours or “bring your own beverage” sessions if you will.

**Syllabus.** There will likely be minor changes and updates to the syllabus throughout the semester. These changes will be announced in class as well as on Piazza. Students should stay up to date by getting in touch with a friend or the instructor, if/when they end up missing class.

## Course Schedule:

### Week-1

**Feb-15: Introduction**

Introduction to Human-Computer Interaction, Computer Science, and Social Good as well as each other. *Before the class, please come prepared to introduce yourself and discuss (i) an example of a technology or technical intervention from any sector (public, NGO, social entrepreneurship, corporate social responsibility, etc.) that you believe to have mainly positive social impacts, and (ii) an example of one that you believe to have mainly negative one. See instructions and add slides* [*here*](https://docs.google.com/presentation/d/1ORNyfR21jp1hgmOavDYTpuMrg3Ct_Mmv_5kV90fXh9E/edit?usp=sharing)*.*

**Feb-17: (Wicked) Problems**

Lecturer: Matthew Mauriello

Readings:

* [Dilemmas in a General Theory of Planning](http://www.sympoetic.net/Managing_Complexity/complexity_files/1973%20Rittel%20and%20Webber%20Wicked%20Problems.pdf), Rittel & Webber
* (Optional) [Technology is Not the Answer](https://www.theatlantic.com/technology/archive/2011/03/technology-is-not-the-answer/73065/), Toyama

**Feb-19: Activity Day**

*What do you want to work on this quarter and why should people join you?*

Activity: Small breakout groups for project brainstorming; class share-out and discussion.

Due: Lecture preferences 11:59 PM

### Week-2

**Feb-22: Theories of social change, “leverage points,” systems thinking.**

Lecturer: Matthew Mauriello

Readings:

* [Leverage Points: Places to Intervene in a System](http://www.donellameadows.org/wp-content/userfiles/Leverage_Points.pdf), Meadows
* (Optional) [Do Artifacts Have Politics?](https://transitiontech.ca/pdf/Winner-Do-Artifacts-Have-Politics-1980.pdf), Winner

**Feb-24: Mechanism Design**

Lecturer: Matthew Mauriello

Reading:

* [Roles for Computing in Social Change](https://www.eecis.udel.edu/~mlm/teaching/docs/Roles-For-Computing-In-Social-Change-Abebe.pdf), Abebe et al.
* (Optional) [Subsidy Allocation in the Presence of Income Shocks](https://www.cs.cornell.edu/~red/AbebeShocks.pdf), Abebe

Due: Submit project proposals by 11:59 PM

**Feb-26: Design Fiction & Critical Mechanism Design**

Lecturer: Matthew Mauriello

Activity: Introduce design fiction activity & revised project proposals

Reading:

* (Optional) [Design Fiction](https://www.eecis.udel.edu/~mlm/teaching/docs/Design-Fiction-Bleecker.pdf), Bleecker (Chapter 1)
* (Optional) [Speculative Design](https://www.invisionapp.com/inside-design/speculative-design/), Tran
* [GDP is a terrible way to measure a country’s economy](https://slate.com/business/2013/05/bill-gates-on-helping-the-poor-gdp-is-a-terrible-measurement.html), Gates

Due: Project preferences 11:59 PM (\*\*Extended to Feb-27\*\*)

### Week 3

**Mar-1: Techno-optimist ICT4D**

Activity: Team assignments, project meetings with instructor, & brief discussion of literature reviews and competitive analysis.

Lecturer: Matthew Mauriello

Readings:

* [The Case for Technology in Developing Regions](http://www.cs.cmu.edu/~mattkam/lab/publications/Computer2005.pdf), Brewer et al.
* (Optional) [The Fortune at the Bottom of the Pyramid](https://people.eecs.berkeley.edu/~brewer/ict4b/Fortune-BoP.pdf) Prahalad & Hart

**Mar-3: ICT4D - Education and Health**

Activity: Brief discussion of project phases & evaluation methods in HCI. (Mauriello)

Lecturer: Matt Leinhauser

Readings:

* (Optional) [Digital Study Hall](https://www.eecis.udel.edu/~mlm/teaching/docs/The-Digital-Study-Hall-DSH.pdf), DHS
* [Projecting Health](https://www.eecis.udel.edu/~mlm/teaching/docs/Project-Health-Community-Led-Video-Education-For-Maternal-Health-Kumar.pdf), Kumar

**Mar-5: Health Technology in Developing Nations (Unofficially)**

Guest Lecture: Edward Wang (University of California, San Diego)

### Week 4

**Mar-8: Limits (Economics) & Activities**

Activity: Breakout groups for project teams to work on project proposals together

Lecturer: Matthew Mauriello

Readings:

* (Optional) [Exponential Economist meets Finite Physicist](https://dothemath.ucsd.edu/2012/04/economist-meets-physicist/), Murphy
* [Information Systems for the Age of Consequences](https://computingwithinlimits.org/2015/papers/limits2015-silberman.pdf), Silberman

Due: Detailed project proposals (11:59 PM) [Project]

**Mar-10: Critical ICT4D: Post-colonial computing**

Lecturer: Maria van Venrooy

Readings:

* [Postcolonial computing: a lens on design and development](https://dl.acm.org/citation.cfm?id=1753522), Irani et al.
* (Optional) [Feminist HCI: Taking Stock and Outlining an Agenda for Design](http://wtf.tw/ref/bardzell.pdf), Barzdell

**Mar-12: Activities**

Due: Speculative Fiction Stories Round 1 (for class) [Individual Assignment, Submit 1st Draft Before Class]

Activity: Swap and share of speculative fiction stories. Discussion of these fictions.

### Week 5

**Mar-15: Data Science for Social Good**

Lecturer: Brad Altmiller

Reading:

* [Large-scale Physical Activity Data Reveal Worldwide Activity Inequality](https://cs.stanford.edu/people/jure/pubs/activity-inequality-nature17.pdf), Althoff et al.
* (Optional) [Discovering Suicide Ideation](https://www.microsoft.com/en-us/research/wp-content/uploads/2016/05/chi16_suicideideation.pdf), De Choudhury

**Mar-17: Critical DSSG**

Lecturer: Eric Wright

Reading:

* [The High Cost of Free Services: Problems with Surveillance Capitalism and Possible Alternatives for IT Infrastructure](https://www.eecis.udel.edu/~mlm/teaching/docs/The-High-Cost-Of-Free-Services-Problems-With-Surveillance-Capitalism-And-Possible-Alternatives-For-IT-Infrastructure-Landwehr.pdf), Landwehr, Borning, & Wulf.
* (Optional) [The Age of Surveillance Capitalism](https://www.eecis.udel.edu/~mlm/teaching/docs/The-Age-Of-Surveillance-Capitalism-Zuboff.pdf), Zuboff

**Mar-19: Mediation in Online Content Platforms (Unofficially)**

Guest Lecture: Dr. Cody Buntain (New Jersey Institute of Technology)

### Week 6

**Mar 22: Activities (*Previously more ICT4D*)**

Review of ECE/CIS Tools, group working time, & feedback from instructor.

**Mar 24: Activities**

Due: Speculative Fiction Stories Round 2

Swap and share of edited or expanded speculative fiction stories. Submit final versions by 11:59 PM.

Reading: None

**Mar-26: Makers and Appropriate Design**

Lecturer: Alina Christenbury

Reading:

* + - * [Democratising Technology: The confluence of makers and grassroot innovators](https://www.eecis.udel.edu/~mlm/teaching/docs/Democratising-Technology-The-Confluence-Of-Makers-And-Grassroot-Innovators-Waldman-Brown.pdf), Waldman-Brown
* (Optional) [Excerpt from Small is Beautiful, Technology with a Human Face](https://www.eecis.udel.edu/~mlm/teaching/docs/Technology-With-A-Human-Face-Schumacher.pdf), Schumacher

### Week 7

**Mar-29: Techno-Democracy**

Lecturer: Matthew Mauriello

Reading:

* [Technologizing Democracy or Democratizing Technology? A Layered-Architecture Perspective on Potentials and Challenges](https://bford.info/pub/soc/dt2-chapter.pdf), Ford

**Mar-31: Community**

Lecturer: Matthew Mauriello

Reading:

* [The Third Pillar](https://www.eecis.udel.edu/~mlm/teaching/docs/The-Third-Pillar-How-Markets-And-The-State-Leave-The-Community-Behaind-Rajan.pdf), Rajan (Introduction pg 80-161)
* (Optional) [Governing the Commons](https://www.eecis.udel.edu/~mlm/teaching/docs/Governing-The-Commons-Ostrom.pdf), Ostrom Pgs 30-33 (Chapter 2 subsection “CPRs and Resource Units”) and Chapter 3 (all- I know it is long; focus on 88-102 if you are strapped for time)

**April-2: Cyberbullying in Social Media (Unofficially)**

Dr. Zahra Ashktorab, Thomas J. Watson Research Center

### Week 8

**April-5: Computing for Conservation**

Lecturer: Shontel Coker

Activity: Introduce blog activity analyzing the impact of a real technology or technical intervention on ethical grounds, directed at a lay audience (imagine public policy makers). May use computational or statistical reasoning, publicly available datasets, etc.

Reading:

* (Optional) [Lions at the Gates](https://www.frontiersin.org/articles/10.3389/fevo.2018.00242/full), Weise et. al.
* [Sustainable HCI](https://dl.acm.org/doi/10.1145/1753326.1753625), DiSalvo et. al.

**April-7: Activity Day**

Activity: In-class artifact review [Project]

**April-9: Accessibility & ASSETS**

Lecturer: Connor Onweller

Reading:

* [Disability Studies as a Source of Critical Inquiry for the Field of Assistive Technology](https://dl.acm.org/doi/10.1145/1878803.1878807), Mankoff, Hayes, & Kasnitz.
* (Optional) [Epidemiology as a Framework for Large-Scale Mobile Application Accessibility Assessment](https://dl.acm.org/doi/pdf/10.1145/3132525.3132547), Ross, Zhang, Fogarty, & Wobbrock.

### Week 9

**April-12: Presentation Day**

Due: Project Presentation I (2:30 PM & 11:59 PM) [Project]

**April-14: Accessibility & Crowdsourcing**

Lecturer: Anna Wu

Reading:

* [VizWiz: nearly real-time answers to visual questions](https://doi.org/10.1145/1866029.1866080), Bigham et al.
* (Optional) [Combining crowdsourcing and google street view to identify street-level accessibility problems](https://doi.org/10.1145/2470654.2470744), Hara, Le, & Froehlich

**April-16: Project Sidewalk (Unofficially)**

Manaswi Saha, University of Washington

Due: Paper (Draft of Intro, Related Work, Solution Design, Eval Plan & Preliminary Results) & GitHub Check-in 11:59 PM [Project]

Week 10

**April-19:** Blue Hen ReCoop Day (No Class)

**April-21: Activity Day**

Meet in breakout rooms for co-working sessions on term projects. Instructor to provide general feedback.

**April-23: Data Problems & Algorithmic Bias**

Lecturer: Paul Townshend

Reading:

* (Optional) [Facial-Recognition Software Might Have a Racial Bias Problem](https://apexart.org/images/breiner/articles/FacialRecognitionSoftwareMight.pdf), Garvie & Frankel
* ["Everyone wants to do the model work, not the data work": Downstream Data Cascades in High-Stakes AI](https://research.google/pubs/pub49953/) Sambasivan et al.

### Week 11

**April-26:** **Human-Centered AI**

Lecturer: Kyle Oak

Reading:

* (Optional) [The Boeing 737 MAX Saga: Lessons for Software Organizations](https://c2y6x2t8.rocketcdn.me/wp-content/uploads/2019/09/the-boeing-737-max-saga-lessons-for-software-organizations.pdf), Johnston & Harris
* [Human-Centered Artificial Intelligence: Reliable, Safe & Trustworthy](https://doi.org/10.1080/10447318.2020.1741118), Shneiderman

**April-28: Automation & Driving**

Lecturer: Emily Taylor

Reading:

* [The Ethics of Driverless Cars](https://dl.acm.org/doi/abs/10.1145/2874239.2874265), McBride
* (Optional) [Will passengers trust driverless vehicles? Removing the steering wheel and pedals](https://ieeexplore.ieee.org/abstract/document/7497804), Schaefer & Straub
* (Optional) [Meet ALVINN, the self-driving car from 1989](https://www.theverge.com/2016/11/27/13752344/alvinn-self-driving-car-1989-cmu-navlab), (The Verge) [Watch Video]

**April-30: Collaborative AI and Trust (Unofficially)**

Guest Lecturer: Dr. Bradley Hayes (University of Colorado Boulder)

### Week 12

**May-3:** **Future of Work**

Lecturer: Matthew Mauriello

Reading:

* [The Impact of Robotics and Automation on Working Conditions and Employment](https://www.eecis.udel.edu/~mlm/teaching/docs/Pham_TheImpactOfRoboticsAndAutomationOnWorkingConditionsAndEmployment.pdf), Pham et al.
* (Optional) [Automation Anxiety as a Barrier to Workplace Automation](https://www.eecis.udel.edu/~mlm/teaching/docs/Eiber_AutomationAnxietyAsABarrierToWorkplaceAutomation.pdf), Eiber at al.

**May-5: Activity Day**

Meet in breakout rooms for co-working sessions on term projects. Instructor to provide general feedback.

**May-7: Activity Day**

Due: In-class Artifact Review II [Project]

### Week 13

**May-10:** No formal class; instead, attend a CHI2021 session and prepare to do a share out during class and write a short reflection on what sessions you attended.

**May-12:** No formal class; instead, attend a CHI2021 session and prepare to do a share out during Friday’s class and write a short reflection on what sessions you attended.

**May-14: CHI 2021 Discussion**

Activity: Open discussion about CHI2021 Sessions attended by class.

Due: Reflection on CHI2021 Sessions (2:29 PM)

### Week 14

**May-17: Blog share and feedback, class review**

Due: Presentation of blog post analyzing the impact of a real technology or technical intervention on ethical grounds, directed at a lay audience (imagine public policy makers). May use computational or statistical reasoning, publicly available datasets, etc.

Reading: None

**May-26 (10:30 – 12:30): Final Exam (Project Presentations)**

*Final Project Presentations & Peer Feedback*

Due: Project Reports (11:59 PM)

## References

This course is derived from several books, papers, and other similar courses on the topic including:

1. Kurtis Heimerl, CSE 599: Computing for Social Good, University of Washington, Spring 2020  
   <https://docs.google.com/document/d/17RNcB0wb3I1ZbAaLXEuwB5W7X32MOVvP8LAhMONxA-Q/edit>
2. Neha Kumar, Technology & Equity (Fall 2020)   
   <https://docs.google.com/document/d/1gIclRPED-CHztyWpoZWjdK6iE-T2r9arsAOOSPYsdfE/edit?usp=sharing>
3. Barath Raghaven, Computing for Social Good (Course, Spring 2019) <https://raghavan.usc.edu/2019-spring-computing-for-social-good/>