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

**Spring 2021, Time:** TR 5:00-6:15 PM (EST) [IES205]

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

**Office Hours:** M1:30–3 PM (EST) or by appointment [SMI408]

**Teaching Assistant:** Aishwarya Chandrasekaran (aishc@udel.edu)

**Teaching Assistant Office Hours:** R 10–11 AM (EST) [SMI102a] or by appointment

**Communications:** Email, Canvas, & Discord

**Final Exam:** R 5/18 3:30 PM – 5:30 PM (EST) [IES205]

## 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:** All 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://chi2023.acm.org/for-authors/late-breaking-work/); 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 topics or works. 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 Canvas under the thread corresponding to the selected reading by 11:59 PM (EST) on the evening prior to class.

*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%):** In addition to participating in class (i.e., showing up, participating in discussion and activities, etc.), each student will be asked to present a topic (~20 minutes) and lead a discussion of the required papers (~30 minutes) plus a brief rundown on the optional materials (if any). 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 14th** by completing the scheduling form with your top three choices in a rank ordered list:

<https://forms.gle/dDSBKcscB5GiB71x9>

## Final Project:

**Initial project ideas (1-page) are due (via email to Instructor) by February 16th. 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 3rd.**

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 **Thursday, May 18th**. Projects will be presented during the final exam period and final papers and GitHub repositories 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 ~10-minute discussion of the project, inclusive of the perspectives shared in the class, will then follow.
3. Students will also complete a Peer Evaluation Form, which will be factored into the final grading.

## 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 Discord. 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-07: 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/1OQe3w2Ef3iuWbkpH3bsCK0th81wRrLUx-xfKTvQ4nss/edit#slide=id.g205d45656ef_0_0)*.*

**Feb-09: (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

### Week-2

**Feb-14:** **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.

**Feb-16: 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

Due: Lecture preferences 11:59 PM

**Feb-17 Due: Detailed project proposals (11:59 PM) [Project]**

### Week 3

**Feb-21: Mechanism Design**

Lecturer: Matthew Mauriello

Reading:

* [Roles for Computing in Social Change](https://www.eecis.udel.edu/~mlm/teaching/Computing-For-Social-Good-s23/docs/Roles-For-Computing-In-Social-Change-Abebe.pdf), Abebe et al.
* (Optional) [Subsidy Allocation in the Presence of Income Shocks,](https://ojs.aaai.org/index.php/AAAI/article/view/6188) Abebe

Due: Project preferences 11:59 PM

**Feb-23: Design Fiction & Critical Mechanism Design**

Lecturer: Matthew Mauriello

Activity: Introduce design fiction activity, team assignments, office hour meetings, & revised project proposals

Reading:

* [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

* [Design Fiction](https://www.eecis.udel.edu/~mlm/teaching/Computing-For-Social-Good-s23/docs/Design-Fiction-Bleecker.pdf), Bleecker (Chapter 1)
* [Speculative Design](https://www.invisionapp.com/inside-design/speculative-design/), Tran

### Week 4

**Feb-28: Techno-optimist ICT4D**

Activity: Brief discussion of literature reviews and competitive analysis. Breakout groups for project teams to work on project proposals together.

Lecturer: Kien Nguyen

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-2: ICT4D - Education and Health**

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

Lecturer: Dea Harjianto

Readings:

* [Projecting Health](https://www.eecis.udel.edu/~mlm/teaching/Computing-For-Social-Good-s23/docs/Project-Health-Community-Led-Video-Education-For-Maternal-Health-Kumar.pdf), Kumar
* (Optional) [Digital Study Hall](https://www.eecis.udel.edu/~mlm/teaching/Computing-For-Social-Good-s23/docs/The-Digital-Study-Hall-DSH.pdf), DHS

### Week 5

**Mar-6 Due: Detailed project proposals (11:59 PM) [Project]**

**Mar-7: HCI4D & Learning**

Guest Lecture: Dr. Aakash Gautam (SFSU)

**Mar-9:** **Limits (Economics) & Activity Day**

Lecturer: Ethan Chang

Readings:

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

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 6

**Mar-14: Critical ICT4D: Post-colonial computing**

Lecturer: Eric Tlaseca - Morales

Readings:

* [Postcolonial computing: a lens on design and development](https://dl.acm.org/citation.cfm?id=1753522), Irani et al.
* (Optional) [Community Building with Co-located Social Media: A Field Experiment with Syrian Refugees](https://dl.acm.org/doi/abs/10.1145/3136560.3136580) Xu et al.

Due: Speculative Fiction Stories Round 2 (11:59 PM)

**Mar-16: Feminism & Computing**

Lecturer: Ahilyn Dipre-Figuereo

Readings:

* [Feminist HCI: Taking Stock and Outlining an Agenda for Design](http://wtf.tw/ref/bardzell.pdf), Barzdell
* (Optional) [“Brush it Off”: How Women Workers Manage and Cope with Bias and Harassment in Gender-agnostic Gig Platforms](https://dl.acm.org/doi/10.1145/3491102.3517524) Ma et al.

### Week 7

**Mar-21: Data Science for Social Good (DSSG)**

Lecturer: Abigail Walters

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-23: Critical DSSG**

Lecturer: Aidan Chao

Reading:

* [The High Cost of Free Services: Problems with Surveillance Capitalism and Possible Alternatives for IT Infrastructure](https://www.eecis.udel.edu/~mlm/teaching/Computing-For-Social-Good-s23/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/Computing-For-Social-Good-s23/docs/The-Age-Of-Surveillance-Capitalism-Zuboff.pdf), Zuboff

### Week 8:

Spring Break – No Lectures.

### Week 9:

**Apr-4:** **Machine Learning & Dangerous Online Mental Health Behaviors**

Guest Lecture: Dr. Stevie Chancellor (UMN)

**Apr-6: Makers and Appropriate Design**

Lecturer: Thern Diallo

Reading:

* + - * [Democratising Technology: The confluence of makers and grassroot innovators](https://www.eecis.udel.edu/~mlm/teaching/Computing-For-Social-Good-s23/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/Computing-For-Social-Good-s23/docs/Technology-With-A-Human-Face-Schumacher.pdf), Schumacher

### Week 10:

**Apr-11: Techno-Democracy**

Lecturer: Maxyne Watkins

Reading:

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

Activity: Brief in-class presentations and share outs about projects.

**Apr 13: Fake News Detection**

Lecturer: Alexander Rusin

Reading:

* [Fake news, disinformation and misinformation in social media: a review](https://link.springer.com/article/10.1007/s13278-023-01028-5), Aïmeur

Activity: In-class peer critiques & team evaluations.

### Week 11

**April-18: Data Problems & Algorithmic Bias**

Lecturer: Ryan Evans

Reading:

* ["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.
* (Optional) [Facial-Recognition Software Might Have a Racial Bias Problem](https://apexart.org/images/breiner/articles/FacialRecognitionSoftwareMight.pdf), Garvie & Frankel

**April-20:** **Human-Centered AI**

Lecturer: Dina Dawood

Reading:

* [Human-Centered Artificial Intelligence: Reliable, Safe & Trustworthy](https://doi.org/10.1080/10447318.2020.1741118), Shneiderman
* (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

### Week 12

**Apr 25: Studio Day**

Activity: Brief in-class presentations and share outs about projects.

Studio Time: Group working time & feedback from Teaching Assistant.

**Apr 27: Automation & Driving**

Lecturer: Greg Mensah

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]

Activity: In-class peer critiques.

### Week 13

**May-2: Designing Ubiquitous Physical Interface**

Guest Lecture: Dr. Lawrence Kim (SFU)

Due: Draft Papers for Paper Check-in (11:59 PM)

**May-4: Computing for Conservation**

Lecturer: Harleen Chahal

Activity: Introduce ethics 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:

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

### Week 14

**May-9: Computing for Accessibility**

Lecturer: Michael Murphy

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.

**May-11:** **Future of Work**

Lecturer: Robert Burns

Reading:

* [The Impact of Robotics and Automation on Working Conditions and Employment](https://www.eecis.udel.edu/~mlm/teaching/Computing-For-Social-Good-s23/docs/Pham_TheImpactOfRoboticsAndAutomationOnWorkingConditionsAndEmployment.pdf), Pham et al.
* (Optional) [Automation Anxiety as a Barrier to Workplace Automation](https://www.eecis.udel.edu/~mlm/teaching/Computing-For-Social-Good-s23/docs/Eiber_AutomationAnxietyAsABarrierToWorkplaceAutomation.pdf), Eiber at al.

### Week 15

**May-16: Blog share and feedback, class review**

Due: Presentation of ethics blog 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-18 (3:30 – 5:30): Final Exam (Project Presentations)**

*Final Project Presentations & Peer Feedback*

Due: Project Reports & Team Evaluations (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/>