Nurturing an Inclusive Community in Computing

This document is a compilation of **actionable advice** on how instructors and teaching assistants can create an inclusive learning environment that promotes the participation and sense of belongingness of all students.

This list is designed so you can put it on the wall where you can glance at it from time to time and see one thing you could work on. You don't need to do everything at once.

Course Prep

- Ensure that lecture slides containing stock photos and illustrations include people of diverse races and genders in non-stereotyped roles.[1]
- Review course materials for the use of gendered pronouns, especially those that confirm stereotypes (e.g., "A programmer should always comment *his* code.") Use of third-person plural pronouns ("they", "their", "them") is now widely accepted as a gender-neutral alternative to singular pronouns (e.g., "A programmer should always comment *their* code.").
- Use arbitrary names in lecture slides and in-class examples. Choose a broader selection (Juan, Neha, Maria, Minseo, Mohammed, instead of just Jane Doe and John Smith).
- Avoid heteronormative examples (e.g., bijective function between sets "boys" and "girls").
- Never say, "This UI is so easy your mom could use it" or "How would you explain this to your mom?" or other phrases that equate women with lack of tech savvy.[2]
- Create programming assignments and examples that show real-world applications of CS. Don't relegate the discussion of larger context to the beginning of a lecture. Keep bringing students back to the real-world application of what they are learning. This can be as simple as showing how a concept is used in a familiar application or program (e.g., how hash maps are used in natural language processing to predict what a user will type into a search engine).
- If your class includes a significant group project, instruct students about your expectation that each member of the team contributes to both technical and professional components. Research has shown that in group projects in engineering classes, female students often find themselves pushed into stereotyped roles by their peers in the group.[3]

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[1] Women of Color in Tech blog's collection of stock photos: http://www.wocintechchat.com/blog/wocintechphotos

[2] This sexist trope is something women have been working to expunge from our vocabulary. Unfortunately, it is still often seen in discussion of UI design. http://geekfeminism.wikia.com/wiki/So_simple,_your_mother_could_do_it

[3] "When working with male classmates, … [female students] often spoke of being relegated to doing routine managerial and secretarial jobs, and of being excluded from the 'real' engineering work." https://hbr.org/2016/08/why-do-so-many-women-who-study-engineering-leave-the-field

Compiled by Joanne Atlee (jmatlee@uwaterloo.ca) for instructors at the University Waterloo. Sources for these guidelines include a document created by Cynthia Lee (cbl@stanford.edu) entitled "What Can I do Today to create a more inclusive community in CS?", resources and tools available from the National Center for Women & Information Technology (NCWIT) website, and advice from UW students and instructors. (Version 25/8/2017).

Start of Term

- Make explicit what you expect students to already know and what you don't expect them to know. Consider a pre-course survey in which students rate their knowledge about key course concepts, and present the survey results on the first day of class

During Lecture

- Take a moment in class today to encourage students to focus on their "slope," not their "y-intercept." That is, in the long run, it matters how fast they're growing and learning, not advantages or deficiencies in where they started.
- Convey to students that hard work and effective practice matters more than DNA. Your beliefs influence students' beliefs and impact their performance.[4]
- Start class today by telling the students you're proud of them and how hard they are working. Tell them you are enjoying working with them this term.
- Start class today by renewing your invitation to students to come to office hours. Not all students believe that you want to interact with them, so explicitly instruct your class in how to do this. For example, tell them: "You don't need to have a particular question—you're welcome to just stop by for 5 minutes to introduce yourself," or "I'm not just here for homework questions—if you are considering changing your major to CS and want to talk about it, if you want to know what it's like to work in the tech industry, if you are thinking about applying to grad school but don't know where to begin, I'm happy to discuss these issues as well."
- Show how computer scientists make a difference. Many students want careers where they can "make a difference." Help your students see that the problems computer scientists tackle can have important social, economic, and cultural impacts.
- Show the diversity of work that computer scientists do. Talk to students about the range of jobs they can find in computing, including the diversity they will find in the type of environment, job tasks, required skills, and the level of collaboration needed.
- Show the diversity of who computer scientists are. Expand students' ideas about who does computer science by using examples that include diverse people doing computing, and bring in speakers or use videos that show diverse people in computing.

Answering Questions in Lecture

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[4] Carol Dweck. "The New Psychology of Success." http://s3.amazonaws.com/ebsp/pdf/mindsett.pdf. This research shows that minority students perform worse in classes where the professor believes in a "fixed mindset" (talent is innate) when compared to performance in classes where professor has a "growth mindset" (talent can be developed through effort). See also CS-specific work on mindsets: Laurie Murphy and Lynda Thomas. "Dangers of a fixed mindset: implications of self-theories research for computer science education." ITiCSE 2008.

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- When a student is speaking, wait for the student to finish then count "one one-thousand, two one-thousand" in your mind before responding. People of all genders are prone to prematurely cutting off women when they speak. You may do this unconsciously unless you consciously add that pause.
- Make the classroom a safe place to make mistakes. When a student gives a wrong answer, say "that is not quite right, but it is close", or "I am glad that you brought it up, because it is a common misconception and gives us the opportunity to come up with the right answer." Work a bit with the first responder towards a correct answer before going to other students for a better answer. This way, students don't feel that they have to have the perfect answer in order to receive positive acknowledgement from the instructor.
- Actively mitigate against overly vocal students who try to answer every question. Appreciate their enthusiasm, but point out how their domination of in-class discussion may intimidate other students. Suggest that they continue to work out answers to questions posed in lecture, but be more reserved in sharing their answers.
- Actively mitigate when students may be intimidating each other. When a student uses jargon in a question (e.g., one of those questions that is more of a boast than a real question), explicitly identify when you expect that most students will not be familiar with that jargon, and when students are not expected to know it for the class (e.g., "Thanks for your comment. For the rest of the class, I'm sure most of you aren't familiar with some of those terms. Don't worry, those terms are outside the scope of this class and not necessary to know.")

Mid Term / End of Term

- Email top performers on a recent homework or exam to congratulate them, and if appropriate encourage them to apply for graduate studies; be sure to include a diverse group.
- Provide students with clear and timely feedback, including class-wide distribution data. Women and minority students often fear the worst about their position relative to the class and can be reassured by data.[5]
- After a midterm exam, step through the math showing the class that students can still pass the course even if they did poorly. It's just some multiplication, but take the time to talk about it. Be factual—no need to "sugar coat"—but provide facts that will help reassure students who think things are worse than they really are.
- Reach out to students who have filed an AccessAbility accommodation form and ask them if their needs are being met in your class. Reaffirm your commitment to comply with their approved accommodations and your willingness to receive complaints if there is a problem.

[5] These fears are related to "Imposter Syndrome"—even highly talented students from underrepresented groups fear that they are unskilled, and more unskilled than everyone else. Overview of Imposter Syndrome research: https://en.wikipedia.org/wiki/Impostor_syndrome

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- Personally invite a woman or a minority student who did well in your class to major in CS, apply to an internship, or go to grad school.[6]

If Someone Brings a Problem to Your Attention

- Nobody is perfect. We have all seen news stories and opinion pieces about real and perceived bad faculty behavior. As a faculty member, perhaps you've feared that something like that could happen to you, or maybe it already has. If someone, especially a student, brings to your attention a misstep such as an inappropriate comment, oversight, or microaggression by you or other course personnel, Step 1 is to listen (attentively, and for the entire duration, without interrupting to explain or question). Do not deny, minimize, or otherwise respond defensively, even if you think that the person is misinterpreting or overreacting. Acknowledge to a student that it took courage for them to approach you, and you appreciate feedback (even when it is hard to hear) because that is what will help you improve. More effective than *saying*, "I am not [racist/sexist/etc] and didn't mean it that way and would never want to hurt anyone," is *showing* that by saying, "I am so sorry that my actions caused pain to anyone." If appropriate (e.g., you made an insensitively worded comment in lecture), publicly acknowledge it to the class, framed as a learning opportunity for students to see healthy humility and lifelong learning modeled for them.

For more information

If you are interested in learning more about creating an inclusive learning or workplace environment, check out the University's inclusivity training courses, starting with OHD502 Principles of Inclusivity.

[6] Holly Lord and Joanne McGrath Cohoon. "Recruiting and Retaining Women Graduate Students in Computer Science and Engineering," 2006.

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