Developing Accessible User Interfaces

Course Syllabus, 5.6, last revised 1/21/2020

* Note that this syllabus is subject to change. Students will be notified about any changes.

Course Logistics

Meeting Times:

Tuesdays, 10:10am – 12:00pm

Meeting Location: Milbank 207

Instructor Information

Instructor: Sarah Morrison-Smith, PhD

- E-mail address (preferred):   smorriso@barnard.edu (put "COMS 3162" in the subject)
- Office hours: TBD
- Office location: Milstein 512
- Class Web site: Canvas Only

To make an appointment, send a formal email with the subject including "COMS 3162" and include your meeting goals, any relevant questions, and several proposed meeting times.

Teaching Assistant: TBD

- E-mail address: TBD
- Office hours: Milstein 503
- Office location: TBD

Course Information

Prerequisites:

COMS W1004, W1005, or W1007

Catalog Descriptions:

- Course Number 3223 – Introduction to Developing Accessible User Interfaces– Points: 3
  Introduction to access technology and the development of accessible systems. In this course, students build and evaluate various access technologies. Topics include: text-to-speech, speech recognition, screen readers, screen magnification, alternative input, tactile displays, and web transformation. This course teaches students the deep inner workings of today's user interface technology and serve as a guide for building the user interfaces of the future.

Course Overview:

Access technology (AT), technology that makes accessible what otherwise isn't, has the potential to increase autonomy and improve millions of people's ability to live independently. This potential is currently under-realized because the expertise needed to create the right AT is in short supply and the custom nature of AT makes it difficult to deliver inexpensively. This course teaches how AT is built to work within the tough technical and human constraints in which it must operate. As early adopters, people with disabilities have inspired a host of future user interface technologies, e.g., conversational assistants, text-to-speech, speech recognition, optical character recognition, predictive typing, tactile displays, etc. People with disabilities continue to be the first users of interface next-generation technologies that are gradually adopted widely. This course does not only teach you the deep inner workings of today's user interface technology but also serves as a guide for building the user interfaces of the future. Topics include: Text-to-Speech, Speech Recognition, Screen Readers, Screen Magnification, Alternative Input, Tactile Displays, Web Transformation, and Disability Studies.

In this class, you'll be exposed to a wide range of interactive accessible technology, learn how it is built, and practice building it using web elements such as HTML, CSS, and JavaScript. This is directly beneficial if you want to have impact in this important area, and broadly beneficial to anyone who wants to build interactive systems. The course gives you the experience to build a variety of different kinds of interactive systems that go far beyond the standard graphical user interfaces of today. This is useful if you intend to build them, or if you want to understand the technological constraints for designing them.

Course Components:

This course involves the following components:
- Lectures: core information about AT will be presented, discussed.
- Quizzes: there will be periodic quizzes throughout the course for class participation points.
- Readings: research papers and other readings will be assigned and discussed.
- Assignments: some will be programming assignments designed to help you understand how AT works at a deep level, others will be meant to introduce you to AT and disability studies.
- Extra credit: there will be opportunities for extra credit throughout the course not to exceed 3% of the final grade.

Learning Outcomes:

By the end of this course, students will be able to:
- *Design and build* access technology
- *Characterize* access technology
- *Assess* access technology evaluations and other disability studies

Course Materials

Textbooks Required:

There are no textbooks required for this course. All course readings will be made available on Canvas.

Affordable Access to Course Texts:

All students deserve to be able to access course texts. The high costs of textbooks and other course materials prohibit access and perpetuate inequity, and Barnard librarians are partnering with students, faculty, and staff to increase access. By the first day of advance registration for each term, you should be able to view on CourseWorks information provided by your faculty about required texts (including ISBN or author, title, publisher and copyright date) and their prices. Once you have selected your classes, here are some cost-free methods for accessing course texts, recommended by the Barnard Library: find out if your faculty has placed the texts on reserve at Barnard Library or another Columbia library, and look for course texts using *CLIO* (library catalog), *Borrow Direct* (request books from partner libraries), *Interlibrary Loan* (request book chapters from any library), and *NYPL*. Students with financial need or insecurity can check items out from the FLIP lending libraries in the Barnard Library and Butler Library and can consult with the *Dean of Studies* and the *Financial Aid Office* about additional affordable alternatives for getting access to course texts. Talk with your librarian and visit the *Barnard Library Textbook Affordability guide* (*library.barnard.edu/textbook-affordability*) for more details.

Software Required:

The following free or trial software packages may be necessary to be installed by students on their laptops or used via online services over the course of the semester:

- IDE suitable for client-side web development (e.g., Jetbrains WebStorm, Eclipse, Sublime Text, Google Dart etc.)

Course Outline

Course Topics:

- Access technology
- Disability studies

Tentative Schedule: subject to change

Week	Date	Topics	Assignments/Milestones
1	1/21	Introduction: Overview of accessibility and its relationship to computation	
2	1/28	Accessibility and "The Web"	Assigned: Assign. 1 *Registration deadline 31st*
3	2/4	Assignment 1 Presentations	Due: Assign 1 in class
4	2/11	Text-to-speech	Assigned: Assign. 2
5	2/18	Screen Readers	Due: Assign. 2 @ midnight Sunday
6	2/25	Magnification	Assigned: Assign. 3 *Last day to drop a course*
7	3/3	Computer Vision	Due: Assign. 3 @ midnight Sunday
8	3/10	Transcoding	Assigned: Assign. 4
9	**3/17**	**Spring break!**	*Holiday*
10	3/24	Input, part 1	Due: Assign. 4, @ midnight Sunday
11	3/31	Tactile Displays	Assigned: Assign 5
12	4/7	Disability studies	Due: Assign. 5, @ midnight Saturday
13	4/14	Language and Cognitive Disabilities	Assigned: Assign. 6
14	4/21	Technology and Mental Health	
15	4/28	TBD	Due: Assign. 6, @ midnight Sunday
16	5/5	Reading Days	
17	5/12	Finals Week	

Tentative Reading List: subject to change

Week	Readings (available on Canvas and the ACM Digital Library, to be discussed in class the week of)
1	No Readings!
2	Stéphanie Giraud, Pierre Thérouanne, and Dirk D. Steiner. 2015. Conceptualization of a technical solution for web navigation of visually impaired people. In Proceedings of the 27th Conference on l'Interaction Homme-Machine (IHM '15). ACM, New York, NY, USA, Article 24, 6 pages. DOI: https://doi.org/10.1145/2820619.2825004. 6 pages Jeffrey P. Bigham, Irene Lin, and Saiph Savage. 2017. The Effects of "Not Knowing What You Don't Know" on Web Accessibility for Blind Web Users. In Proceedings of the 19th International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS '17). ACM, New York, NY, USA, 101-109. DOI: https://doi.org/10.1145/3132525.3132533. 9 pages
3	No Reading!
4	Volker Sorge, Charles Chen, T. V. Raman, and David Tseng. 2014. Towards making mathematics a first class citizen in general screen readers. In Proceedings of the 11th Web for All Conference (W4A '14). ACM, New York, NY, USA, , Article 40 , 10 pages. DOI: http://dx.doi.org/10.1145/2596695.2596700. 10 pages
5	Lucas Pedroso Carvalho and André Pimenta Freire. 2017. Native or Web-Hybrid Apps?: An Analysis of the Adequacy for Accessibility of Android Interface Components Used with Screen Readers. In Proceedings of the XVI Brazilian Symposium on Human Factors in Computing Systems (IHC 2017). ACM, New York, NY, USA, Article 38, 10 pages. DOI: https://doi.org/10.1145/3160504.3160511. 10 pages
6	Jeffrey P. Bigham. 2014. Making the web easier to see with opportunistic accessibility improvement. In Proceedings of the 27th annual ACM symposium on User interface software and technology (UIST '14). ACM, New York, NY, USA, 117-122. DOI: https://doi.org/10.1145/2642918.2647357. 6 pages
7	Leah Findlater, Lee Stearns, Ruofei Du, Uran Oh, David Ross, Rama Chellappa, and Jon Froehlich. 2015. Supporting Everyday Activities for Persons with Visual Impairments Through Computer Vision-Augmented Touch. In Proceedings of the 17th International ACM SIGACCESS Conference on Computers & Accessibility (ASSETS '15). ACM, New York, NY, USA, 383-384. DOI: https://doi.org/10.1145/2700648.2811381. 2 pages Hernisa Kacorri, Kris M. Kitani, Jeffrey P. Bigham, and Chieko Asakawa. 2017. People with Visual Impairment Training Personal Object Recognizers: Feasibility and Challenges. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17). ACM, New York, NY, USA, 5839-5849. DOI: https://doi.org/10.1145/3025453.3025899. 12 pages
8	Sarit Felicia Anais Szpiro, Shafeka Hashash, Yuhang Zhao, and Shiri Azenkot. 2016. How People with Low Vision Access Computing Devices: Understanding Challenges and Opportunities. In Proceedings of the 18th International ACM SIGACCESS Conference on Computers and

	Accessibility (ASSETS '16). ACM, New York, NY, USA, 171-180. DOI: https://doi.org/10.1145/2982142.2982168. 10 pages
9	**No reading!**
10	Eric Corbett and Astrid Weber. 2016. What can I say?: addressing user experience challenges of a mobile voice user interface for accessibility. In Proceedings of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI '16). ACM, New York, NY, USA, 72-82. DOI: https://doi.org/10.1145/2935334.2935386. 11 pages
11	Dorothea Reusser, Espen Knoop, Roland Siegwart, and Paul Beardsley. 2019. Feeling Fireworks: An Inclusive Tactile Firework Display. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19). ACM, New York, NY, USA, Paper 429, DOI: https://doi.org/10.1145/3290605.3300659. 11 pages
12	Megan Hofmann, Jeffrey Harris, Scott E. Hudson, and Jennifer Mankoff. 2016. Helping Hands: Requirements for a Prototyping Methodology for Upper-limb Prosthetics Users. In Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16). ACM, New York, NY, USA, 1769-1780. DOI: https://doi.org/10.1145/2858036.2858340. 12 pages
13	Luz Rello. 2015. Dyslexia and web accessibility: synergies and challenges. In Proceedings of the 12th Web for All Conference (W4A '15). ACM, New York, NY, USA, Article 9, 4 pages. DOI: https://doi.org/10.1145/2745555.2746655. 4 pages.
14	Rui Wang, Min S. H. Aung, Saeed Abdullah, Rachel Brian, Andrew T. Campbell, Tanzeem Choudhury, Marta Hauser, John Kane, Michael Merrill, Emily A. Scherer, Vincent W. S. Tseng, and Dror Ben-Zeev. 2016. CrossCheck: toward passive sensing and detection of mental health changes in people with schizophrenia. In Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp '16). ACM, New York, NY, USA, 886-897. DOI: https://doi.org/10.1145/2971648.2971740. 12 pages
15	Shiri Azenkot, Jacob O. Wobbrock, Sanjana Prasain, and Richard E. Ladner. 2012. Input finger detection for nonvisual touch screen text entry in *Perkinput*. In Proceedings of Graphics Interface 2012 (GI '12). Canadian Information Processing Society, Toronto, Ont., Canada, Canada, 121-129. 9 pages

Grading:

The following items will contribute to students' grades in this course:

Grade Category	Percentage	Letter	Range (%)
<u>Individual</u>		A	93–100
Assignment 1	12%	A-	90–92
Assignment 2*	20%	B+	87–89
Assignment 3*	20%	B	83–86
Assignment 4*	20%	B-	80–82
Assignment 5*	20%	C+	77–79
Assignment 6	18%	C	73–76
		C-	70–72
* Lowest score will be dropped		D+	67–69
		D	63–66
Class participation (includes quizzes)	10%	D-	60–62
Total	**100%**		

NOTE: A C- will not be a qualifying grade for maintaining good academic standing. The concept of satisfactory academic progress mandates that students maintain a minimum GPA of 2.0 or better (C or better). Note: an average of C- is equivalent to a GPA of 1.67 and therefore does not satisfy this requirement. For more information on grades and grading policies, please consult Barnard's policies regarding academic standing https://barnard.edu/grades-exams.

All final course grades will be rounded to the nearest whole number.

This course will use the Canvas e-Learning course management system via CourseWorks to post grades and to communicate with class members. If you have a question about the course that other students could benefit from hearing the answer, please post to the appropriate discussion thread on Canvas rather than sending individual emails to the instructor.

Grade reviews must be requested within one week of a grade being posted. After two weeks, no grade will be revisited. In the event of a grade review, the entire assignment will be reviewed. Grade reviews must be requested in writing with an explanation describing why student believes the grade received is incorrect. Similarly, **inquiries about missing grades must be made within one week of grades being posted**.

Honesty & Collaboration:

High-level questions can be discussed amongst each other and amongst the groups. Plagiarism (misrepresenting others' ideas as your own, can be fixed with simple citation) is not allowed in this course.

As for other courses at Barnard, offenders will be held to the Barnard Honor Code (see below) including reporting incidents to the Dean of Students. The results of this can include failing grades and disciplinary action (which can lead to expulsion).

Course Policies

Late Assignments:

All assignments will be assessed a late penalty of -10% for each day late. After 3 days, students will receive a 0. The only exception to this rule is if students contact the instructor **in writing before the assignment due date** to make arrangements for lateness. Excuses are not accepted. Notifications of mental or physical illness/injuries must be accompanied by a doctor's note.

Attendance:

Attendance will not be graded. Engagement in class discussions is graded, however, so if students must miss class, the instructor recommends increasing participation on the other days. If a student is sick or will be absent for a significant period of time, please contact the instructor to work out a way to catch up.

Make-ups:

Students who contact the professor **before the due date** with appropriate requests for extension and/or makeup assignments will be given an additional amount of time to make up late assignments equal to the time lost due to the unforeseen circumstance.

Incompletes:

Incompletes will be granted for only the most extreme circumstances, e.g. medical or family reasons. To be considered for an incomplete, the student **must** 1) let the professor know in advance that they are seeking an incomplete, and 2) provide documentation to support the request.

Classroom Expectations:

To be courteous to your fellow students, please:
- Turn all cell phone ringers to silent and step outside if you must take calls.
- Turn off all audible notifications on laptops and phones.
- Refrain from texting during class.
- Use laptops only for taking notes, looking up relevant information, or answering quiz questions (no Facebook, YouTube, Twitter, etc.).

Guest Lectures:

In this course, guest lecturers may be invited to present material related to their research or work, and how it relates to the course material. These are experts in their fields and are

taking time out of their busy schedules to share their knowledge with you. Please respect their time and attend the guest lectures as you would any other meeting of the course.

College Policies and Resources

Honor Code:

Barnard students are bound by The Honor Pledge, established 1912, updated 2016, which states, "We, the students of Barnard College, resolve to uphold the honor of the College… We pledge to do all that is in our power to create a spirit of honesty and honor for its own sake."

The Honor Code (https://barnard.edu/dos/honorcode) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor. Note that failure to comply with this commitment will result in disciplinary action compliant with the Barnard

Academic Accommodations for Students with Disabilities:

If you believe you may encounter barriers to the academic environment due to a documented disability or emerging health challenges, please feel free to contact me and/or the Center for Accessibility Resources & Disability Services (CARDS). Any student with approved academic accommodations is encouraged to contact me during office hours or via email. If you have questions regarding registering a disability or receiving accommodations for the semester, please contact CARDS at (212) 854-4634, cards@barnard.edu, or learn more at barnard.edu/disabilityservices. CARDS is located in 101 Altschul Hall.

Wellness

It is important for undergraduates to recognize and identify the different pressures, burdens, and stressors you may be facing, whether personal, emotional, physical, financial, mental, or academic. We as a community urge you to make yourself—your own health, sanity, and wellness—your priority throughout this term and your career here. Sleep, exercise, and eating well can all be a part of a healthy regimen to cope with stress. Resources exist to support you in several sectors of your life, and we encourage you to make use of them. Should you have any questions about navigating these resources, please visit these sites:

- http://barnard.edu/primarycare
- http://barnard.edu/counseling
- http://barnard.edu/wellwoman/about
- Stressbusters Support Network

Software Use

All faculty, staff, and students of Barnard College are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are

also against Barnard's policies and rules, disciplinary action will be taken as appropriate. We, the members of the Barnard College community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.