SYLLABUS **BETA BETA BETA**

INFO 6301: COMPUTATION FOR RESEARCH IN INFORMATION SCIENCE

FALL 2018, 3 CREDITS, 28 AUGUST – 19 DECEMBER 2018

INSTRUCTOR INFORMATION

Name: Stephen Voida
Office Location: TLC 294
Office hours: By appointment
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COURSE COORDINATES:

TTh 12:30pm–1:45pm, Eaton Humanities 335

COURSE INFORMATION

"Official" course description and purpose: "Introduces principles of computational thinking through the manipulation, transformation and creation of data artifacts used in research. Students will be exposed to a high level overview of algorithms, functions, data structures, recursion and object oriented computer programming through a series of assignments that emphasize the use of computation as a means of scholarship."

Revised/Updated course description and purpose: "Examines the diversity of roles that computation can play in information science research, ranging from an overview of some data-driven practices to prototyping and infrastructure development to computation-as-research-support. Provides students with a level of computational literacy to engage with the multiplicity of roles that computation serves in the different kinds of research work that is happening all across INFO, including exemplars of different kinds of technical contributions and approaches."

This course is one of the six Foundation course requirements of the Information Science PhD program. INFO PhD students should be aware that, per the current version of the INFO Graduate Student Handbook (v3.1), "Courses in which grades below B- (2.7) are received are not accepted for doctoral programs."

This course has no pre- or co-requisite registration requirements. *However, we are limiting our enrollment for the first "beta" offering of this course in order to encourage and enable honest, small-group discussion about the scope of the course, the ordering and organization of topics and the*

organization and structure of the course deliverables.

Textbooks and Materials

No textbooks are required for this delivery of the course.

Assigned articles and selected book chapters will be provided in PDF format via the Canvas website associated with the course. Students are expected to respect copyright law (and its associated Fair Use provisions) and to not further disseminate or redistribute these course materials outside of their own personal use for this course.

Assignments

Reading Summaries

In order to ensure that all students are adequately prepared for discussion and ready to join in the in-class activities, for each class period in which you are not presenting, you will write a 3-point summary of and thoughts about **each** of the required course readings.

- Briefly *summarize* the work in about a paragraph (i.e., describe what the authors did in just a few sentences).
- Identify some *potential research implications or opportunities* from this reading as they apply to your work (or work in your field). How would you apply the techniques, outcomes, or contributions of this paper in the work that you [want to] do?
- List at least three *discussion points or issues* that you would like to raise/pursue as part of our in-class discussion.

These summaries are to be completed individually (e.g., not in consultation with one another) and are due at **8:00pm the night before the article(s) are discussed**, to allow incorporation of some of the more interesting points and questions into the in-class discussion. Please note that your grade for this component of the class will be determined based on whether you completed the assignment on time (e.g., submitted an online post including all three *clearly enumerated* required elements), not necessarily on whether you were able to fully grasp all of the nuances of these (admittedly sometimes complex/dense) articles. The goal of this assignment is to demonstrate your preparation for the in-class discussion; as a result, late submissions **will not be accepted/scored.**

Of the 14 class meetings for which we have assigned readings, you are required to submit **at least 12 classes worth** of reading summaries. *You may elect to drop/skip up to two classes' worth of summaries without penalty (or explanation)*—please use these drops to account for illnesses, travel, overwhelmingly busy weeks, etc.

Class Participation

I expect students to be appropriately prepared for each class meeting, to attend all class meetings on

time, and to conduct themselves in a professional manner. The central focus of this course is a seminar-style discussion of the many roles that computing plays in Information Science research. Every student in the classroom is expected to play an active role in shaping and contributing to that discussion.

Following the first week, class participation will be assessed each ***day*** on a 5-point scale using the following rubric:

- Actively participating in the discussion; contributing multiple times to the discussion with thoughtful, relevant comments or questions and/or actively helping to maintain the shared class notes document in Google Drive: 5/5 (100%)
- Incidental participation in the class discussion; contributing minimally with relevant comments or questions and/or minimal participation in documenting the in-class discussion in the shared class notes document in Google Drive: 4/5 (80%)
- Present and attending to the class discussion, with the contribution to the discussion including completing the reading summary and proposed in-class discussion questions submitted to Canvas prior to class: 3/5 (60%)
- Not physically present in class: 0/5 (0%)

The lowest ***four*** in-class participation scores will be automatically dropped, allowing you some flexibility in the case that an out-of-class emergency comes up (e.g., illness, traffic accident, paper deadline, etc.) However, you will still be responsible for covering the assigned readings and submitting your summaries for every week (even if you can't physically be present), and you will be held to all technology tutorial and project deadlines, since these projects involve the participation of multiple students working in teams.

Technology Tutorials

One important skill for conducting research in information science is to be able to identify relevant technologies and how to use them in analyzing data, constructing new tools, or understanding the user experience of prototype applications. This class will introduce a number of these critical technologies, and students are encouraged to identify additional technologies of relevance to their prior experience and/or personal research trajectories in dialog with their advisor(s) and/or the course instructor. Each student will be responsible for developing a tutorial for a given technology for **3 out of 5** of the primary modules of the course. These tutorials are intended to give the audience an understanding of what the technology is, how to obtain it, and how to use it in practice to develop some application—that is, an example of how to "get started" using the technology. Tutorials should also include a list of references and/or URLs that a novice could use to become more expert or gather additional information about the technology.

Students may work individually or in groups of up to two on developing this "how-to" tutorial. The tutorials are to be posted to a campus-accessible wiki (https://cmci.colorado.edu/infopedia) and will be made available to students in this and subsequent semesters as "jumping-off" points for scoping their

research projects. Topics for your tutorial must be approved by the instructor in advance, and the instructor can help to identify potential technologies that would be suitable for developing a corresponding tutorial.

Technology tutorials consist of two deliverables. The first is a short (approximately 15-minute), in-class presentation of the content of the technology tutorial, with a short walk-through or demonstration showing how the technology might be used. The second is the technology summary, "how-to" write up, and references, which should be posted to the wiki as a shared resource for students in this (and subsequent) semesters to use as a reference.

A few of things to bear in mind about each technology tutorial assignment:

- For most all of the students in the class, this assignment is about learning a new technology. *I don't expect students to become experts in using these technologies.* The goal is to provide the class with a mechanism to "divide and conquer" the process of learning about new technologies. If everyone takes the time to dig around on the web to understand one new technology and then teaches it to everyone else, we all collectively learn about a half-dozen new technologies for each module—a Good Thing!
- Given that all of the students in the course will be learning about new technologies, much of what I expect students to do is to spend time *researching what resources already exist* on the Internet to help newcomers get started with a technology. Often, the information that this assignment requires you to produce and present exists someplace online already—"getting started" tutorials or Software Development Kits (SDKs) from a technology company's website, Q&A posts from coding community websites (e.g., StackExchange), blog posts from other enterprising developers, etc. Find and aggregate the "good parts" from these resources; this will help to save the rest of the class time that we might have spent doing the same thing later on.
- When you're working with a new technology, much of the initial cost is spent figuring out where to start. This is about as far as I expect students to go with these tutorials:
    - *What is the [device/software toolkit/tool] good for, from a research perspective?*
    - *Where do you get the [device/software toolkit/tool]?*
    - *What other equipment/software/supplies do you need to make it work?*
    - *How do you connect it to your [computer/prototype/design process]?*
    - *What is one example of a step-by-step set of instructions to get the technology to do the most basic thing that it can do (i.e., a "Hello World" program or output)?*

The idea is that students will show someone how to get through all of the typically-annoying startup stuff so that if they wanted to use the [device/software toolkit/tool], they'd at least be ready to go and know where to look for more details with a minimum of overhead.

Final Project

The purpose of the project is to gain experience applying computation to a research problem or domain of your own, synthesizing your results in written form, and presenting them in a public venue (this class). You are required to develop a project that utilizes computation for data analysis, prototyping, or

application development; this project may expand on or extend research that you are already undertaking in collaboration with your advisor, but it should be a significant step above and beyond work that you have done previously. The project will be presented to the class in a workshop-like session at the end of the semester. The results of this project should also be reported in a 6–10-page long manuscript following the formatting for standard ACM conference proceedings.

Although the kinds of projects that you propose/work on will vary in scope, the *computing* focus of this course means that your project should include a significant application of the computing concept that we are covering in this course—application or toolkit development, automated data collection and processing, platform scripting, or the like.

Talk to the instructor before settling on a project and submitting a project proposal. You are encouraged to work individually or in groups of no more than 2 students, although this limitation may be waived with instructor approval; your proposal should include a justification for the number of group members and your group's composition, relative to the scope of and goals for the research project.

More details about each specific deliverable will be provided as the course progresses. Note that for each deliverable, projects undertaken by teams must **also submit a corresponding team assessment**. These team assessments must be signed by each team member and submitted in hardcopy. Your individual grade on the project will depend on both the overall group grade and your contributions to the group's work, as reported in peer evaluation forms that you will submit at each research project milestone.

High-quality submissions may be nominated by the instructor for assistance in revising and submitting their work to a suitable, peer-reviewed publication venue (e.g., CHI, UIST, Ubicomp, or many others, depending on your area of research!).

(Working) Course Calendar

Week	Date	Course Module	Daily Topic	Reading(s)	Assignment(s) Due
1	28 Aug	***Module 0: Introduction***	Course overview and syllabus walkthrough		
	30 Aug		Syllabus redux; Anchoring articles: Computational thinking, code as contribution	Hudson & Mankoff, 2014 Wing, 2006 Fogarty, 2017	Reading summaries
2	4 Sep	**Module 1: Programming and Scripting**	Module overview; exemplar research papers	Goble, 2014 Hastings, Haug & Steinbeck, 2014 Voida, Mynatt &	Reading summaries

				Edwards, 2008	
	6 Sep		In-depth tech tutorial: Python basics "crash course"	Kazil & Jarmul, 2016 (ch. 1–2)	Reading summaries
3	11 Sep		In-depth tech tutorial: Python data structures "crash course"	Kazil & Jarmul, 2016 (ch. 3)	Reading summaries
	13 Sep		In-depth tech tutorial: Scripting using bash and AppleScript	—	*TBD*
4	18 Sep		Student-led tech tutorial workshop (3x20)	—	—
	20 Sep		Student-led tech tutorial workshop (3x20)	—	Module 1 Tech Tutorial write-ups due (Sun 9/23, 11:59pm)
5	25 Sep		Module wrap-up: How to leverage software engineering techniques and best practices in your research code (guest instructor)	Brooks, Jr., 1995 (pp. 3–35) Peatsch et al., 2003	Reading summaries
	27 Sep	**Module 2: APIs, Software Infrastructure, and Toolkits**	Module overview; exemplar research papers	Edwards, Newman & Poole, 2010 Linton, Vlissides & Calder, 1989 Myers, Hudson & Pausch, 2000 Bigham & Ladner, 2007	Reading summaries
6	2 Oct		In-depth tech tutorial: Using REST APIs in Python	Kazil & Jarmul, 2016 (ch. 13)	Reading summaries
	4 Oct		Student-led tech tutorial workshop (3x20)	—	—
7	9 Oct		Student-led tech tutorial workshop (3x20)	—	Module 2 Tech Tutorial write-ups

					due (Sun 10/14 11:59pm)
	11 Oct		*Mid-term town hall meeting and flex day*	*TBD*	*TBD*
8	16 Oct	**Module 3: Prototyping and Technology Probes**	Module overview; exemplar research papers	Buxton, 2007 (pp. 238–259) Hutchinson et al., 2003 Abowd et al., 2005	Reading summaries
	18 Oct		In-depth tech tutorial: Tinkering with Arduino	*TBD*	*TBD*
9	23 Oct		Student-led tech tutorial workshop (3x20)	—	—
	25 Oct		Student-led tech tutorial workshop (3x20)	—	Module 3 Tech Tutorial write-ups due (Sun 10/28 11:59pm)
10	30 Oct	**Module 4: Sensing, Input, and Data Acquisition**	Module overview; exemplar research papers	Voida, Patterson & Patel, 2014 Hinckley et al., 2000 Harrison, Tan & Morris, 2010	Reading summaries
	1 Nov		In-depth tech tutorial: Acquiring and storing data (tentative)	Kazil & Jarmul, 2016 (ch. 6)	Reading summaries **Final project initial proposal due**
11	6 Nov		Student-led tech tutorial workshop (3x20)	—	—
	8 Nov		Student-led tech tutorial workshop (3x20)	—	Module 4 Tech Tutorial write-ups due (Sun 11/11 11:59pm)
12	13 Nov	**Module 5: Data Analytics**	Module overview; exemplar research papers	Dumais et al., 2014 Hansen & Smith, 2014?	Reading summaries

	15 Nov		In-depth tech tutorial: Data cleanup and exploration using Python (tentative) **Final project early-stage poster/feedback session (15 mins)**	Kazil & Jarmul, 2016 (ch. 7–9)	Reading summaries **Final project poster due (in class)**
13	20 Nov	**FALL BREAK**			
	22 Nov				
14	27 Nov		Student-led tech tutorial workshop (3x20)	—	—
	29 Nov		Student-led tech tutorial workshop (3x20)	—	Module 5 Tech Tutorial write-ups due (Sun 12/2 11:59pm)
15	4 Dec	**Module 6: Research Collaboration Infrastructure**	Module overview	*TBD*	Reading summaries
	6 Dec		In-depth tech tutorial: Managing code, documentation, and presence with Github	Git Flight Rules *TBD*	Reading summaries
16	11 Dec	**Course wrap-up and final presentations**	Final project presentations	—	—
	13 Dec		Final project presentations (continued); Final course reflections and wrap-up	—	—
Finals	19 Dec (Weds)		*(All course deliverables must be submitted by 7:00pm MST)*		**Final project write-up due**

Grading

10%—Reading summaries
20%—Class participation, including active participation in delivering and working on Tech Tutorials (10%)
50%—Technology tutorials (3, 16.67% each)
20%—Final project (10% for the oral component; 10% for the written report)

This course will use a standard 100-point grading scale:

93.0% and above:	A
90.0%–92.9%:	A-
87.0%–89.9%:	B+
83.0%–86.9%:	B
80.0%–82.9%:	B-
77.0%–79.9%:	C+
73.0%–76.9%:	C
70.0%–72.9%:	C-
67.0%–69.9%:	D+
63.0%–66.9%:	D
60.0%–62.9%:	D-
Below 60.0%:	F

Assignments are expected to be submitted on time. In fairness to the instructor and students who completed their work on time, a grade on assignment deliverables shall be reduced 10% if it is submitted late and a further 10% for each 24-hour period it is submitted after the deadline; submissions received more than 48 hours late will not be graded. Reading summaries **will not** be accepted after the specified deadline; a late submission on these assignments will result in a zero grade.

Using Canvas and Other Technologies

This course will use Canvas (https://canvas.colorado.edu/courses/21271) as the primary instructor–student communication hub. Submissions will be collected via Canvas, and any changes in this syllabus will be communicated via Canvas Announcement postings. The instructor will also monitor online Discussion forums hosted as part of the Canvas course site to address questions or needed clarifications about course content, assignments, etc. I strongly recommend that you check in on the Canvas course site at least once during each class meeting day to stay apprised of any course- or assignment-related updates.

Communication

All email communications related to this course should include a subject heading that begins with “INFO

6301" so that I am sure not to miss your email in a what is at times a VERY crowded inbox. Better yet, post your questions to the associated Canvas Discussion board. If you have a question, it is very likely that another student has that same question, so please ask! You will be doing your classmates a favor.

Timing and Availability

Your instructor responds to course-related emails during the professional workday (between 9am and 5pm on weekdays). You should expect to receive a response to your email within 24 hours (exclusive of weekends; profs go hiking/biking/skiing, too!). Please plan ahead and understand that course deadlines drive most of the emails I need to respond to; if you email right before a deadline, your email might be at the end of a very long queue that I will do my best to get through prior to the deadline, but cannot guarantee.

Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see Temporary Medical Conditions under the Students tab on the Disability Services website.

Classroom Behavior

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on classroom behavior and the Student Code of Conduct.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code

(honor@colorado.edu); 303-492-5550). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (including sexual assault, exploitation, harassment, dating or domestic violence, and stalking), discrimination, and harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website.

Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

Religious Observances

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, students are expected to contact me to arrange for any necessary scheduling accommodations within the first *three* weeks of classes. See the campus policy regarding religious observances for full details.