IWKS 3300/5300 | CSCI 2940
SPRING 2019
COURSE SYLLABUS

http://inworks.ucdenver.edu/jkb/iwks3300

Instructor: John K. Bennett
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Office Hours: Tuesday, 3:00 PM -4:00 AM Inworks Office
Others by appointment.

Note: My travel schedule will on occasion cause me to miss office hours. If this happens when you really need to see me, send me mail.

Meeting Times: Lecture: 9:30 - 10:45 AM T-Th (Inworks 1300)
Laboratory: Both in class and unscheduled (Inworks 1300)

Prerequisites: A level of programming experience consistent with a CSCI 1410/1411, or IWKS 2300. If you are in doubt about your abilities, talk to me in the first week of class.


Piazza Group “IWKS-3300” - I will use Piazza to communicate important class information. Piazza is a private course management tool that provides support for you to ask questions and to respond to questions raised by other students. Project 0 will provide instructions for how to enroll (You will be invited to join this private group on Piazza during the first week of class.)

COURSE ENROLLMENT MAY BE LIMITED – This course may be enrollment-limited due to lab constraints. Information on enrollment will be discussed at the first class meeting.

Course Description
Computing devices and software are ubiquitous in our society, but most of us use these affordances without any real understanding of how they are created. NAND to Tetris seeks to give you a fairly deep understanding of how computers are built and programmed. Few students, even computer science students, have the opportunity to develop this understanding during their undergraduate career. This is in part because the courses that teach this material have become highly specialized, and they tend to appear in different tracks of the computer science curriculum. In contrast, this course integrates key notions from algorithms, computer architecture, operating systems, compilers, and software engineering into a single unified framework, which allows us to cover a lot of ground in a single semester. We will take a constructionist approach, by building a general-purpose computer system from the ground up. In the process, we will explore many ideas and techniques used in the design of modern hardware and software systems, and discuss major trade-offs and future trends. Throughout this journey, you will gain many cross-section views of the computing field, from the bare bone details of switching circuits to
the high level abstraction of object-based software design. Also, this course is relatively new at CU Denver, making you pioneers. Please be patient when the wheels occasionally fall off of the wagon.

**Tests:** It is my hope and expectation that a projects-based class will support purposeful learning without the need for periodic examinations.

**Participation in the Research Project Associated with the Course:**
As you may know, how best to teach courses like Nand to Tetris is a subject of considerable debate and research. Some of the techniques that will be used to teach IWKS 3300/5300 / CSCI 2940 are experimental, and throughout the course we will use various measures to help us evaluate their effectiveness. We will try to make these activities fun and engaging. Some activities will be online, and some we will do in class. Some of these activities are intended to help you better master the course material, and some are intended to help us make the course better. Your participation in the activities related to this research is voluntary. Your participation, or non-participation, will not impact in any way the grade that you will receive in IWKS 3300/5300 / CSCI 2940.

**Electronic Submission of Course Work:** In an effort to kill fewer trees, I have endeavored to make this a paperless class. All homework and lab assignments will be turned in electronically, as described on the pages associated with those topics.

**Projects:** Projects will be assigned more or less weekly. These assignments are generally designed to be completed by one or two students. The reason for this is that most software is in fact developed by teams, and working together often improves learning. The potential downside of team-based work is that some team member might not pull their weight. This issue is addressed by having anonymous peer evaluations. At the end of the semester, each member of a pair will evaluate the contributions of their partners (including themselves).

**Turning in Projects:** In lieu of printing out pages of code, you will upload your completed working projects as a zipped archive as described on the lab web page.

**Class Work:** Work in this class will consist of both individual and pair activities.

**Individual:**
1. reading the assigned materials, attending class, and participating in class discussion
2. completing all individual assignments
3. completing peer evaluations for the members of your team at semester’s end

**Team:**
1. completing all projects
2. helping others complete all projects (bonus for 100% completion)

**Optional:**
1. completing optional projects

**Grading:** Each project assignment is worth a particular number of points. I may also assign bonus points for particularly excellent or innovative work, and for helping others with their assignments during class. The relative value work in this course is as follows:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Assignments</td>
<td>75% + up to 15% bonus</td>
</tr>
<tr>
<td>Class Attendance and Participation</td>
<td>25% + up to 5% bonus</td>
</tr>
<tr>
<td>Optional Assignments</td>
<td>Up to 20% bonus</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100% + bonus</strong></td>
</tr>
</tbody>
</table>
Lab Hardware and Software:
You may use any computer system available to you to complete work for this course. The software necessary to complete the labs can be downloaded at no cost from the links in the labs tab. Machines with these (and other) software tools installed are available in Inworks.

Class Mechanics:

Attendance - **Students in IWKS 3300/5300 / CSCI 2940 are required to attend class.** Much of the material presented in class is complementary to the material learned in lab, and for that reason, class attendance is required. In addition, material necessary to complete many assignments will only be covered in class. If you aren’t there, you are missing important material, and may be letting your teammate down. **You may miss up to two classes without penalty; after that your course grade will be negatively impacted.** Your course grade will benefit from not missing any class. If you must miss class, please tell me beforehand. Those with extraordinary circumstances such as serious illness should contact me as soon as possible.

Workload - Keeping up with the assigned work is crucial. **If you get behind, you will never catch up.** You should expect to spend **at least** two to six hours per week on this course, besides time in class, on average (some weeks will be lighter, others heavier). You can spend more time if you want, of course, but let me know if you find that it is taking you more time than that just to keep up.

A Word to the Advanced Student - One of the problems in any course is that people come in with different amounts of background, so defining activities at the right level for everyone is hard. I expect that some of you will already know quite a bit about computer systems. In designing the activities for the class I have tried to choose activities that will be valuable to people at all levels, though in different ways. But please let me know if you feel that I'm asking you to do something that does not seem worthwhile, or if some modification would make it more useful for you. I also hope that you'll share your experiences and skills with the rest of the class.

Use of the Inworks Facilities – This course takes place in Inworks. The Inworks prototyping facilities offer a wide variety of tools and equipment that allow you to design and fabricate working prototypes of your innovations. Many of these tools and equipment are potentially dangerous to you or to others if operated in an unsafe manner. In addition, the operation of Inworks prototyping equipment has inherent potential risks, including rotating machinery, moving tools and blades, flying objects, hot objects, sharp objects and tripping hazards. Safe use of our facilities requires strict adherence to principles of general workshop safety and to the specific safety requirements for each machine or tool. In order to use the Inworks prototyping facilities you must:

1) Receive training on the safe use of this equipment
2) Demonstrate proficiency using the equipment to an Inworks staff member (your instructor is an Inworks staff member)
3) Sign the “Inworks Terms of Use” agreement indicating your promise to comply with those terms of use.

Use of the Inworks Computers – For use in lab, Inworks provides laptop computers preloaded with all required software. In order to make these computers fully functional, we have not locked them down fully. As a result, shared use of these computers requires strict adherence to the following rules for use:

- **You may not install software of any kind.**
- Personal files may only be place on the desktop, and these files must be removed at the end of your session (this is just like the Inworks Prototyping space – we expect you to clean up after yourself). You can save and restore your work from a USB drive, from DropBox, One Drive or similar web-based storage (your personal account), or via email.
- **You may not attempt to recover deleted files from another user.**
- **Inworks computers may not be removed from Inworks.**
**Academic Integrity** - There may be on-line (or course file) solutions for some of the assignments. Do not use them, or those of your colleagues (except when you are supposed to be working together). It is fine (and in fact encouraged) to work together on course assignments, even individual assignments (where this makes sense), but each student is responsible for mastering the material and turning in the documentation indicated that demonstrates their personal completion of the assignment. Representing someone else’s work as your own is serious academic misconduct, a gross breach of academic integrity, and will likely result in you failing this course. Any questions regarding this policy, as it relates to any work required for this course, should be referred to me.

**Honor Code** - All students of the University of Colorado Denver are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. Incidents of academic misconduct will be reported to the appropriate academic unit. Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion).

**Student Code of Conduct** - Students are expected to know, understand, and comply with the ethical standards of the university, including rules against plagiarism, cheating, fabrication and falsification, multiple submissions, misuse of academic materials, and complicity in academic dishonesty. Please see the Student Code of Conduct and the Academic Honor Code at for suggestions on ways to avoid academic dishonesty.

**Accommodation of Disabilities** – The University of Colorado Denver is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you have a disability or think you have a disability and need accommodations to succeed in this course, I encourage you to contact Disability Resources and Services (DRS) and/or speak with me as soon as you can. All such discussions will remain confidential. I am committed to providing equal access as required by federal law and would like to help develop strategies for your success in this course. If you have a temporary medical condition or injury, please likewise discuss your needs with me.

If you qualify for accommodations because of a disability, please give me a copy of your letter from Disability Services in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities.

DRS is located in the Student Commons Building, Suite 2116.
E-mail: disabilityresources@ucdenver.edu
Phone: (303) 315-3510

**Mental Health and Well-Being**
I recognize that sometimes confronting difficult life circumstances or personal problems can make it impossible to focus the way you would like to on your studies. Please know that your well-being comes first—and please take advantage of campus resources to provide support in difficult times. The Student and Community Counseling Center serving the downtown campus is located in room 454 of the Tivoli, providing weekly drop-in hours. You can also reach them at (303) 315-7270 or for emergency after-hours support at (303) 615-9911. In terms of the class, please talk with me as early as possible so we can devise a strategy or modified timeline for your work in the class. I do not need to know details, and any such discussion will remain confidential.

The Campus Assessment, Response, and Evaluation (CARE) team was created to promote a safe and productive environment for learning, living, and working by addressing the health and safety needs of students and the campus community. If you or someone you know is in need of help, please reach out at (303) 315-7306 or at shareaconcern@ucdenver.edu so that the CARE team can provide assistance. More information can be found at http://www.ucdenver.edu/life/services/CARE/Pages/default.aspx.
Non-Discrimination - The University of Colorado Denver is committed to maintaining a positive learning, working, and living environment. The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities. (Regent Law, Article 10, amended 11/8/2001). CU Denver will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this policy, “Protected Classes” refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, or veteran status.

Additional Resources:
If you wish to report discrimination or need additional information, contact the EO/AA Compliance Officer at Human.Resources@ucdenver.edu (303-315-2700) or send correspondence to PO Box 173362, Campus Box 130, Denver, CO 80217-3362.

The Ombuds Office is a resource available to all members of the University community. It is an independent source that will provide informal, confidential and neutral services to members of the university community in resolving conflicts, complaints, and disputes. You can reach the Ombuds Office downtown at (303) 315-0046 or in the Lawrence Street Center, Suite 1003; and at the Anschutz Medical Campus at (303) 724-2950 or in Building 500, Room 7005C.
CU Denver’s Nondiscrimination Policy can be found at: CU Denver Nondiscrimination Policy.

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, we will make every reasonable effort to accommodate you in this regard. Please let me (and your teammates) know as soon as you know that you will be absent.

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 differences of race, color, culture, religion, creed, politics, veteran’s status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Academic freedom and diverse viewpoints are also highly valued at the University of Colorado Denver and in this classroom. As specified in the Law of Regents 5.D, “All members of the academic community have a responsibility to protect the university as a forum for the free expression of ideas.” Any behavior to the contrary will not be tolerated. Our commitment is to create a climate for learning characterized by respect for each other and the contributions each person makes to class. We ask that you make a similar commitment.

Classroom Identity - Class rosters are provided to the instructor with your 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.

Electronic Cigarettes (e-cigarettes) - The use of e-cigarettes is distracting in the classroom environment not only to the instructor, but to other students. The use of e-cigarettes on the Inworks premises is prohibited at all times. Any student who does not comply with this rule will be asked to leave the area immediately so as to not disrupt the learning environment. Pursuant to the Auraria Campus Smoking Policy, the use of e-cigarettes indoors and within twenty-five (25) feet of any entrance is strictly prohibited. See http://www.ucdenver.edu/faculty_staff/employees/policies/Policies%20Library/Admin/Smoke-Free.pdf for additional information.
Use of Laptops, PDAs and Cell Phones in Class:
Using an electronic device during class distracts other students, and is likely to adversely affect your grade (a recent study at CU found that students who routinely use their laptop, etc. in class performed no differently on average from students who did not attend class at all.) I also recognize that some of you may have a desperate need to check email, update your Facebook page, or tweet. So here is my policy: For the first 5 minutes of class, you may use whatever silent device you wish, for whatever purpose you wish. After that, you may not. If you cannot abide by this policy, find another class. Caveats: Your use of an electronic device cannot be disruptive or offensive to others. Also, I usually make announcements and answer questions during this time; you are responsible for this information. There are two exceptions to this rule: 1) if we are all using computers in class, 2) if I am demonstrating how to use course software using my computer, you are welcome to follow along using your computer (but not to check your email, update your Facebook status, etc.).

Last updated 1/15/19