CS 341
Programming Language Design and Implementation
Spring 2018

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Course Web Site	http://www.cs.uic.edu/~i341/
Piazza Forum	http://piazza.com/uic/spring2018/cs341

Overview

The goal of CS 341 is to open your mind to other ways of problem solving. Because problem solving is often influenced by the programming language you use, we study different languages and how they impact the way you think. At UIC (and most American universities and colleges), you are taught an *imperative* style of thinking using a language such as C, Java or Python. This has a tendency to bog down your thinking with low-level details concerning bits, bytes, pointers and efficiency. While interesting at first, there are much more productive ways to problem solve. In CS 341 you will learn a variety of problem solving paradigms, including generic, object-oriented, functional, declarative, event-driven, and parallel. You'll practice these paradigms using a number of different languages: C++, F#, SQL, and C#.

CS 341 is not run like a traditional lecture-based class, but is based instead on *Peer Instruction*. This approach works well with technical subjects, especially in larger classes. Peer instruction will start on the 2nd day of class, which means you need to bring your iClicker to class, and participate in at least 50% of the questions to receive class participation credit. You may miss at most 4 "PI" classes without penalty; see the Class Schedule on the last page for dates.

iClicker and Textbooks

You will need an iClicker device (version 1 or version 2 is fine). There are two required textbooks:

1. "*A Tour of C++*", by B. Stroustrup (ISBN 978-0321958310), and
2. "*Functional Programming Using F#*", by M. Hansen and H. Rischel (ISBN 978-1107019027).

There is one recommended textbook (if you don't already have a textbook that discusses OOP):

3. "*OOP Demystified*", by J. Keogh and M. Giannini (ISBN 978-0072253634).

Programming Environment

The course involves a significant amount of programming using a variety of different languages. For this reason we'll standardize on a single programming environment: *Visual Studio 2017 Community*. This is a professional-grade IDE freely-available from https://www.visualstudio.com/downloads/ . Note that you *cannot* substitute VS Code, nor Visual Studio for Mac --- you need VS Community 2017, Professional 2017, or Enterprise 2017. When you install Visual Studio 2017, be sure to install the following *workloads*:

1. .NET desktop development
2. Desktop development with C++
3. Data storage and processing
4. Data science and analytical applications

Visual Studio requires Windows, version 7 or newer. If you are working on a platform other than Windows, you should either (a) dual-boot with Windows, or (b) run Windows in a virtual machine such as *VirtualBox*. In either case, you will need a copy of Windows 10, and be sure to provide at least 80GB to the Windows partition. There are various ways to legally obtain a copy of Windows 10. Option 1 is to take advantage of the department's participation in Microsoft's Imagine program. If you have an account, you can download Windows 10, Visual Studio 2017, and other software from

https://e5.onthehub.com/WebStore/ProductsByMajorVersionList.aspx?ws=3df7340e-7e9b-e011-969d-0030487d8897&vsro=8

Option 2 is to obtain a copy from Microsoft: https://www.microsoft.com/en-us/software-download/windows10. Follow the instructions under "Using the tool to create installation media". After you install windows, you will need a license key to legally activate your copy of Windows. You can obtain a key from the U of I webstore: https://webstore.illinois.edu/shop/product.aspx?zpid=2899. Windows 10 is free to all UIC students.

If you don't want to mess with creating a virtual machine or dual-booting, you can download a pre-made VM from Microsoft. These VMs expire after 90 days, but it's enough to get you through most of the semester: https://developer.microsoft.com/en-us/microsoft-edge/tools/vms/ .

If you do not own a personal computer, here are two options. Option #1 is to use the CS 109 computer lab, SE2249E SELE. The lab computers contain Visual Studio Community 2017, and the room is open 24/7; however after-hours and weekend access is not guaranteed since the building may be locked. Option #2 is to borrow a low-end Windows laptop from the CS department; these machines have Visual Studio installed (although it might be an older version, in which case you'll need to install VS Community 2017). Post privately to Piazza with your name and netid, and a machine will be provided in 24-48 hours; you may keep this machine for the duration of the semester.

iClicker

Class participation is expected of all students, and requires an iClicker device. You can use an older v1 device (without the LED screen), or one of the newer v2 devices (with small LED screen). iClickers can be purchased in the bookstore, or borrowed from a friend; do *not* purchase a "webClicker" which runs on a smartphone / laptop — the delay makes this approach unusable in class. For participation to be properly recorded, you must register your device on the class Blackboard site:

1. Go to http://uic.blackboard.com/, login, and open the cs341 class site.
2. Select Tools from the site menu.
3. On the Tools page, Select i>clicker Student Registration from the list of items (very end?).
4. Enter the serial number from the back of your iClicker device in the iClicker Remote ID box.
5. Click Submit to confirm the registration.

Clicker usage will begin on the 2nd day of class.

iClicker Teams

Peer instruction is based on team (aka "peer") discussion. During class, the goal is to sit, work and discuss with other students in the class. During the first 2 weeks, try to build your "iClicker team", i.e. 2 or 3 students you like to work with during class.

Piazza, not email

Due to the volume of email I receive, please do not use email for communication — all class-related emails will be ignored. The one exception are matters of a personal nature, in this case you can (and should) email myself or your TA. Appropriate personal matters include family emergencies, classroom issues, and grading disputes.

To provide assistance, answer questions, and post announcements, we will be using a forum-based web site called *Piazza*. You should think of Piazza as your primary mechanism for all class-related discussions and questions. Piazza allows students and staff to help one another, reducing the *time-to-answer*. Your professor and TAs will check Piazza repeatedly each day — you should get in the habit of doing the same. Before posting, please search Piazza as the answer to your question may already be online. When posting, please follow these guidelines:

1. *Look before you post* — the main advantage of Piazza is that common questions are already answered, so search for an existing answer before you post a question. Posts are categorized to help you search, e.g. "Pre-class" or "HW".
2. Post publicly — only post privately when asked by the staff, or when it's absolutely necessary (e.g. the question is of a personal nature). Private posts defeat the purpose of piazza, which is answering questions to the benefit of everyone.
3. Ask pointed questions — do not post a big chunk of code and then ask "help, please fix this". Staff and other students are willing to help, but we aren't going to type in that chunk of code to find the error. You need to narrow down the problem, and ask a pointed question, e.g. "on the 3rd line I get this error, I don't understand what that means…".
4. Post a screenshot — sometimes a picture captures the essence of your question better than text. Piazza allows the posting of images, so don't hesitate to take a screenshot and post; see http://www.take-a-screenshot.org/ .
5. Don't post your entire answer — if you do, you just gave away the answer to the ENTIRE CLASS. Sometimes you will need to post code when asking a question --- in that case post only the fragment that denotes your question, and omit whatever details you can. If you must post the entire code, then do so privately --- there's an option to create a private post ("visible to staff only").

You should have received an invitation to join Piazza via email. If not, you can join by browsing to the Piazza site and enrolling:

http://piazza.com/uic/spring2018/cs341

Announcements, Lecture Notes, Handouts, etc.

Announcements will be made in class whenever possible. However, all announcements will be posted on our class Piazza site, so if you miss class please check Piazza for announcements. Copies of all materials — lecture notes, handouts, practice exams, etc. — are available from the course web page: http://www.cs.uic.edu/~i341/. Finally, videos of each class are recorded by UIC's UICast system and posted to Blackboard (Tools >> Echo360).

Grading

The course will consist of a variety of graded work: class participation, homework assignments, programming projects, exams, and a final project. The homework assignments are meant to be short, and intended to help you understand the class material; these will typically be due at the start of class. Programming projects will be larger and more involved, typically with 5-7 days to complete. The final project will involve a presentation focusing on a programming language topic of your choice, providing a chance to explore an area of interest. Finally, there will be 2 exams and a cumulative final exam; see the Class Schedule (last page) for dates. Your final score will be determined based on the weighting of your individual scores, as follows:

Class participation:	05%
Homework:	16%
Programming Projects:	32%
Final Project:	05%
Exams (2 @ 12% each):	24%
Final Exam:	18%

Class participation is based on participation during Peer Instruction ("PI"). For each "PI" class listed in the Class Schedule (last page), you must attend class & participate in at least 50% of the questions using your iClicker. You may miss at most 4 "PI" classes without grade penalty — this includes both unexcused and excused absences (medical, sports travel, etc). You can expect 1-2 homework assignments per week, due before the start of class; your lowest homework score will be dropped. No projects are dropped.

Your final letter grade will be determined using the traditional 90-80-70-60 scale; however, the scale may shift downward, e.g. 88-78-68-58. Grading mistakes do happen, and so it is in your best interest to review all returned materials and published scores for correctness. Once a score is posted, there is a 2-week re-grading period where mistakes can be corrected. After the 2-week period, the posted score becomes official.

Academic Honesty

Unless stated otherwise, all work submitted for grading *must* be done individually. While I encourage you to talk to your peers and learn from them (e.g. your "iClicker teammates"), this interaction must be superficial with regards to all work submitted for grading. This means you *cannot* work in teams, you cannot work side-by-side, you cannot submit someone else's work (partial or complete) as your own. The University's policy is described here:

http://www.uic.edu/depts/dos/docs/Student%20Disciplinary%20Policy.pdf .

In particular, note that you are guilty of academic dishonesty if you extend or receive any kind of unauthorized assistance. Absolutely no transfer of program code between students is permitted (paper or electronic), and you may not solicit code from family, friends, or online forums. Other examples of academic dishonesty include emailing your program to another student, copying-pasting code from the internet, working in a group on a homework assignment, and allowing a tutor, TA, or another individual to write an answer for you. It is also considered academic dishonesty if you click someone else's iClicker with the intent of answering for that student, whether for a quiz, exam, or class participation. Academic dishonesty is unacceptable, and penalties range from failure to expulsion from the university; cases are handled via the official student conduct process described at http://www.uic.edu/depts/dos/studentconductprocess.shtml .

Class Schedule

Lecture meets MWF from 4-4:50pm. "PI" implies the class is based on peer instruction, which means class participation is required with your iClicker. In terms of topics, you can expect weeks 1-4 to cover object-oriented and generic programming with C++, weeks 5-8 to cover functional programming with F#, and the remainder of the class to cover event-driven programming (C#), declarative programming (SQL), dynamic programming (JavaScript), and parallel programming (varied).

	Monday	Wednesday	Friday
January	**15: NO CLASS**	17: non-PI	19: PI
	22: PI	24: PI	26: PI
	29: PI	31: PI	
February			02: PI
	05: PI	07: PI	09: PI
	12: PI	14: PI	16: non-PI
	19: EXAM #01	21: PI	23: non-PI
	26: PI	28: PI	
March			02: PI
	05: PI	07: PI	09: PI
	12: PI	14: PI	16: PI
	19: PI	21: PI	23: no class
<< break >>	**26: NO CLASS**	**28: NO CLASS**	**30: NO CLASS**
April	02: PI	04: PI	**06: EXAM #02**
	09: PI	11: PI	13: PI
	16: PI	18: PI	20: PI
	23: PI	25: PI	27: PI
	30: non-PI		
May		02: presentations	04: presentations
	Tuesday, May 8th : **FINAL EXAM** (3:30pm – 5:30pm)		