Research Methods in Computer Science  
Fall 2019

CSCI 701-1       TTh 2:00-3:15 PM            PM 252

Instructor:  Dr. Reva Freedman  
Email:  rfreedman@niu.edu  
Phone:  My office has no phone. In emergency (i.e., if email not available), call the CSCI office at (815) 753-0378, and they will forward a message.
Office hours:  TTh 12:15-1:45 PM in PM-554 (at 12:15 I may be found in PM-252
Course web site:  http://faculty.cs.niu.edu/~freedman/701/
NB: Most course materials will be on Blackboard under CSCI 701
If there is any sample code, it will be on turing at ~t90rkf1/d701 or a location listed in the assignment

Course goals: To master the skills needed to be a beginning Computer Science researcher. Specific topics are listed at the end of this syllabus.

Communication with the professor: The best way to contact me is in person, followed by email. I will be happy to talk to you about questions or concerns at any time, including any topic relating to this course or other relevant topics. I encourage you to address small problems before they become big problems, not the day before the exam.

I try to respond to email by the next business day, but there are occasional exceptions. Questions that can be answered from reference material may not be answered. Questions requiring major debugging are best handled in person.

If you need to send code, send a zip file using the same format as for submissions. Do not send pictures of any textual data, i.e., copy and paste the text instead.

Late-breaking news, e.g., errors in assignments and weather emergencies, will be posted on Blackboard. Personal messages will be sent to your NIU email. I suggest you check both every morning.

Class schedule:  If the university is closed for weather or other reasons, class will automatically be cancelled. If weather or other emergencies arise, class cancellations will be announced as soon as possible via Blackboard.

Textbooks: Information about the topics covered in class can be found in the slides, on the class website and/or on websites of your choice. Class attendance will be necessary to keep up. In addition, there are five required books (in hardcopy or e-book format). There will be other required readings posted on Blackboard. There will also be some recommended or alternate readings.

Slides used in class will be posted at some point after the lectures in which they are used.

Software: Multiple sources of open source software will be used in this class.

Attendance and quizzes: Attendance is required. You have three free absences. Save them for minor illnesses, schedule conflicts and similar issues. After that, each absence will reduce your final grade by 3 points.
You are responsible for all material covered in class. If you miss a class, you must get notes from another student before the next class, not from the instructor. Research has shown that students who attend class regularly do better regardless of other behaviors.

Although many or most class materials will be posted on Blackboard, that is for your convenience. This is not an online class, and there is no assumption that you can learn everything without coming to class.

Class participation: Class participation is encouraged and will make the class more interesting for you and for other students. If you have a question, there are probably three other people with the same question who are even more shy than you.

Please ask ASAP if you don’t understand, if I make a mistake, or if you are just curious about something. Questions about details, big ideas, concepts, algorithms, examples, related ideas and applications are all welcome.

Assignments: There will be frequent written assignments and oral presentations. No late assignments will be accepted. For Blackboard assignments due at midnight, I suggest you submit them by 11:57 PM to make sure they are received on time.

In general, there are no extensions on assignments. No assignments may be submitted after the last day of classes.

If you believe your assignment has been graded incorrectly, you must see the instructor within one week after the assignments have been returned.

Your 4-letter ID is the first four characters of your last name as it is recorded on myNIU. All quizzes, written assignments and exams must contain your 4-letter ID in capital letters along with the quiz or assignment number. All assignments submitted on Blackboard must use the naming convention specified in the assignment, including your 4-letter ID in lower case.

Programs: I am not currently planning any programming in this class, but I am including the rules for programs anyhow. If a programming assignment allows late submission, there will be a penalty. To receive full credit, programs must (a) work, (b) follow the specifications, (c) be comprehensible to humans, (d) be accompanied by any requested writeup. If multiple versions (e.g., source, object, and/or output) are required, they must be consistent.

There will be a penalty if your program does not follow the coding, layout, documentation or submission standards referred to in the assignment, for example, e.g., if you do not submit the correct format, do not submit all the files, submit extra files or submit files with incorrect names.

You may not use external code (from other people or from the web) without permission, with the exception of code from the official Python libraries. All programs must run in Python 3 on turing/hopper unless otherwise specified. I encourage you to develop them on turing, but if you don’t, make sure you test them on turing before you submit them. There will be a penalty for not following naming conventions or the class Python style guide.

Evaluation: You will receive two grades on many assignments. One will tell you how you are doing on mastering the material, and the other one will give you full credit for making a conscientious attempt. The purpose of this is to ensure that anyone who attends regularly and masters the material will receive an A. If you attend regularly and master a large portion of the material, the grading scale has been set up so that you will receive a B.
In general, if you are not in class on the date of a presentation, you will not receive credit for it. You may receive partial credit for submitting your slides.

Attendance is required at the final exam slot, Tuesday, December 10, noon-1:50 PM. There will be a suitable closing assignment, whether it is a traditional closed-book, closed-notes exam, a take-home exam or a project presentation. Exams will be conducted in accordance with the department’s academic integrity policy, which is available on the course web site.

It is possible that one or two of the assignments will be in-class exams, containing short-answer questions and/or short essays.

You are expected to take the exams on the assigned time and date. Missing an exam is an extremely serious matter: makeup exams will only be given if all of the following requirements are satisfied: (a) an unavoidable reason (e.g., car accident), (b) advance notification, (c) written documentation, (d) permission of instructor, (e) for final exam, permission of department.

Please notify me if you meet the university’s criterion for rescheduling a final exam, namely that you have three finals on the same day and this course is the highest-numbered of the three. The university deadline for scheduling a makeup final is Monday of the last week of classes. Documentation will be required.

**Grading:** Each assignment will be assigned a point count according to difficulty and the amount of time required. Grades will be calculated based on the total point value of all assignments.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&gt;= 90</td>
</tr>
<tr>
<td>A-</td>
<td>&gt;= 89</td>
</tr>
<tr>
<td>B+</td>
<td>&gt;= 88</td>
</tr>
<tr>
<td>B</td>
<td>&gt;= 80</td>
</tr>
<tr>
<td>C+</td>
<td>&gt;= 78</td>
</tr>
<tr>
<td>C</td>
<td>&gt;= 70</td>
</tr>
<tr>
<td>D</td>
<td>&gt;= 60</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 60</td>
</tr>
</tbody>
</table>

**Class decorum:** In classes for freshmen, I state the following rule on the syllabus: “No activity that interferes with learning, i.e., one that may distract other students or the instructor, is permitted in class. For example, eating, talking (whether in person or on the phone), newspaper reading, and regularly being late or leaving early are not permitted.” In a class for seniors and graduate students, I assume it is not necessary to state such a rule explicitly; however, the rule remains in force.

Research has shown that activities such as texting and checking your email interfere with your retention of the material, however, they in general do not interfere with other people’s ability to concentrate. Therefore these are permitted in case of emergency only, since the purpose of this class is to build a research community.

**Special circumstances:** Students with special needs (disability accommodation, religious observances, required military service, major illness or other unexpected events) are encouraged to contact the instructor as soon as possible. Commuting, having a lot of work for your other classes, being busy at your job, and network problems are not special circumstances; they are normal circumstances that everyone has.
**Disability accommodations:** The instructor will provide all of the accommodations to which you are entitled by law. If you need an accommodation for this class, you must provide a notification letter from the Disability Resource Center. Once you provide a copy of the notification letter, we will have a private conference to determine how your approved accommodations will be handled in this class. This conference must be held and agreement reached before any accommodations can take effect. No accommodations will be allowed retroactively.

If you wish to take your exams at the DRC office, you must also follow DRC regulations with regard to exam scheduling.

For these reasons you should contact the DRC as soon as possible. They are located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 or drc@niu.edu. Also, please contact me privately as soon as possible to discuss possible accommodations – there is no need to wait until you have received the notification letter.

**Academic integrity:** You are encouraged to study together, however, that does not mean doing assignments together. Practice on problems from class, from the slides, or your own problems. Do the programs and any written assignments yourself.

You are expected to do your own work on the homework, programs and exams. Cheating includes, but is not limited to, copying work from other students, copying work from other textbooks, copying work from the Internet, or allowing others to do the same, whether deliberately or not.

You may not post material from this class, including answers to the homework assignments, on any public web site.

All cheating will result in the filing of an academic misconduct form and will affect your course grade, with the possibility of failing the course and/or losing your student job. The penalty for a first offense is usually two letter grades. Note that a second academic misconduct offense may result in your expulsion from the university.

If there are any programming assignments, we may use mechanized source comparison on them.
TOPICS

How to situate your work in a research community
  Importance of being novel but also situated in existing work
  Different kinds of relevant related work
  Learning the structure of your field

How to write a bibliography
  What kind of items belong in a bibliography vs. a footnote or common knowledge
  Using the highest quality version available, e.g., journal vs. conference
  Practical aspects, e.g., consistency of format
  Primary vs. secondary references
  Digital libraries

Design of experiments
  Paradigms of computer science research
  Experimental design and basic statistics (e.g., t-test, F-test, chi-square)
  Ethics and the IRB (Institutional Review Board)
  Why it’s so hard to find out system architecture

Where to publish
  How to identify a high-quality conference/journal
  Citation counts
  Citation indexes and the role of publishers
  The CORE conference listing and its equivalents
  Lists of spam journals

How to publish
  Planning a conference or journal article
  Selective vs. non-selective posters
  The role of proceedings in Computer Science
  Style guides
  Gender-neutral language

How to participate in reviewing
  Conference processes
  Journal processes
  How to write a conference paper review
  How to write a journal paper review

How to present you
  Planning and giving a talk
  Designing and producing a poster
  The work of Edward Tufte
  Other types of presentations: firehose session, panel presentations, being a respondent

Networking
  The work of Phil Agre
BIBLIOGRAPHY

Required books


Note that these five books together cost less than one programming textbook and will be considerably more useful.

*Make sure you get the current edition. Some of these books have changed considerably from earlier editions.* A standard bibliographical convention for “third edition” is “3/e”; I’ve written out the words in capital letters instead to remind you of the importance of using the latest edition for this particular set of books.

Electronic editions are fine and can save you a considerable amount of money. Remember that Amazon provides a free Kindle e-reader app for the PC as well as for other devices.

“Minor thesis” is an Australian term. It is approximately equal to our master’s thesis. I assigned the Zobel minor thesis book because the content will be more relevant to some of you; I assigned the equivalent PhD dissertation book also because it will be relevant to others. In addition, the PhD dissertation book is better written and more interesting to read.

There are other books similar to the Barros book. You may find another one preferable, and you may not need any of them.

Except for the Zobel 2015 book, there are equivalent books available for the other categories as well. I have assigned the ones I think will be most useful, but you are welcome to use others as well. If you find a particularly useful one, let me know.