CS 469

Revision as of 23:40, 24 January 2023 by Bjohnson114 (talk | contribs | block) (→Assignments) (diff) ← Older revision | Latest revision (diff) | Newer revision → (diff)

CS 469/569 Linux and Unix Administration and Networking is a course required in the information science concentration of the CS major.

This page contains the syllabus for CS 469 and is used to keep track of assignments, etc. as well for the most recent offering (spring 2023). For announcements, click the link in the table of contents.

Contents

General Information

Course website - https://cs.indstate.edu/wiki/index.php/CS_469

Your Instructor

Ben Johnson, Mo Sorkhpar, supervised by Jeff Kinne
Offices: Root Hall A-165, A-166, A-142 and in Microsoft Teams
Instructor Office Hours: TBD

Lecture, Exam

Lecture: Tuesdays 6-8pm over Zoom (link in Canvas, see below), and recorded

Mid-term exam: TBA

Final exam: Monday, May 1 at 7pm

Asynchronous students: For students who will be mostly participating asynchronously even though the course is being offered synchronously, you should pick a regular time each week to check in with the instructor. Make an appointment with the instructor during the first 2 weeks at this time to make sure you are on track. Each week at this time, write an email or Teams message to the instructor to let them know how things are going and if you have any questions.

Prerequisites - A minimum of a C in CS201 for undergraduates and a minimum of a A- in CS500 for graduates.

CRN numbers - 12106 for the 469 and 12109 for 569

Required text Most information required for the course is available on-line. Sources that can be used for the course include the following.

- The Unix on-line manual pages (man command)
- The GNU info pages (info command)
- Wikipedia.org
- Tutorials Point: Unix, Sed, Awk, Administration, Docker, IPv4, Computer Networking

Course notes are at https://cs.indstate.edu/~jkinne/cs469-s2022/lesson.php

Announcements/Assignments/Quizzes

This section will be kept up to date with announcements of assigned reading, assignments, quizzes, etc. This will be kept as a "stack" with the most recent at the top of the list.

Assignments

- h1 is due Friday, January 13th at the end of the day. Please make sure you handin the files to avoid getting points deducted for being late.
- h2 due Friday, January 20th at the end of the day.
- h3 due 2023-01-28 23:59:59 (Saturday, end of day).

Announcements

- Jan 10th
  - Assignment h1 posted
  - Mo has sent out everyone's cs469 accounts. Make sure you can get into it and email one of us if you have any problems.
    - Make sure to update your finger info with **chfn** and your password with **passwd**.
- Jan 17th
  - Common commands review
  - Vim quick start
    - For more vim commands see https://devhints.io/vim
  - Regular Expressions (Regex)

- Online regex pattern testing regex101.com
- Using grep

Course Description and Content

Course Description

The catalog description for this course is: "Includes installation and configuration of Unix/Linux operating system software; set-up of hardware and software for Unix/Linux networking including TCP/IP, FTP, Telnet, DNS, DHCP, and Apache; Unix/Linux administration tasks including directories, users, tuning, backup, security, and networking."

In terms of depth, the course approximately 2/3 Unix/Linux administration including a small amount of Bash scripting and 1/3 networking administration. Those who have done well in CS151 should be familiar with most of the programming concepts used in this course.

Normal Content

- Wild-cards and regular expressions
- Files and directories:

  - The file-system tree, path traversal, links
  - Unix permissions and ACLs
  - The FHS standard: where things go in the file-system

- Bash scripting:

  - Invocation and startup, job control
  - Command lists, pipelines, redirection
  - Positional parameters and special variables, data types, the environment
  - Functions, variable scope
  - Conditionals and loops
  - Bash built-ins: read, printf, alias, etc
  - The core-utilities: sed, col, grep, tr, basename, dirname, etc.

- Processes and threads:

  - Attributes of processes: understanding ps,top, etc output
  - /proc filesystem
  - Signals
  - Resource limits
- Memory layout: security issues: buffer overflows, ASLR

- Libraries
- The boot process: boot loaders, the kernel, init, runlevels, init scripts
- Disks: Block devices, partitioning, making file-systems, mounting/unmounting them, checking them, configuring fstab Swap and virtual memory
- RAID: levels, MD devices and mdadm
- Basic MySQL administration: DB and user administration and backing up/archiving databases
- Common Administrative tasks:

  - User/group administration
  - Log files, accounting files and reporting
  - Quotas

- Networking:

  - SSH and related tools for key generation and management, scp, rsync
  - Various networking terms / OSI model
  - SSL/TLS certificates (openssl), creating signed certificates, setting up a CA purpose of certs, anatomy of a cert
  - IPv4 networking: Packets, Ethernet, ARP, DNS, CIDR, basic routing
  - The Linux Firewall (iptables) (time permitting)

Course Outline Weeks 1-8:

- Covers: Basic UNIX commands, the file-system, scripting with bash, processes and libraries, Virtual Machines, partitions and file-systems, the boot process, device files, non-networking services.
- Exam #1

Weeks 8+:

- Covers: Networking infrastructure and configuration, networking services, certificates.
- Final Exam

Learning Outcomes

- Comprehensive overview of command line tools used by a system administrator
- More advanced bash scripting
- Ability to install and configure a Linux system
- Some Virtual Machine experience

Grading and Assignments

The students of this course have the following responsibilities: read assigned readings before lecture, attend lecture, complete homework assignments, take in class quizzes, take exams, and possibly complete a project. The final grade consists of:

Quizzes: 10% total. There should be a quiz approximately once per week. For blackboard quizzes you will be allowed to use your notes for the quiz, any other type of quiz, use of notes or Internet or crib sheets will be decided on a case-by-case basis.

Homework: 25% total. There will be a homework assignment most weeks. The total of all homework assignments is worth 25% of the final grade. If you turn in the assignment late, I may grade it at 80%. Homework turned in after I've discussed the assignment in class WILL NOT BE ACCEPTED. NOTE: you may ask me to look over an assignment before it is due and I may help by pointing out mistakes that need correction and provide other feedback.

Exams: 55% total. We will have two exams. A mid-term worth ~100 points, and a final exam worth ~150 points. Class Attendance/Participation: 10% total. Attendance will be taken at the beginning of each class.

Late Work - Assignments will generally be available to still handin for around a week after their due date. Once the solutions are posted and discussed, late submissions will no longer be graded. Quizzes will normally need to be taken on the day they are due, or perhaps within a few days of when they are due. Solutions will normally be discussed or posted within a week of their due date. Not accepting late work that is more than about a week old is in part because it takes much longer to grade quizzes/assignments that are no longer super fresh in the instructor's head, and in part to try to keep everyone in the class working on the same material.

Start Assignments and Quiz Studying Early - I suggest attempting an assignment the day it is given, or the day after, so that if you have a problem you can ask early. If you continue to have problems in trying to complete the assignment, you will have time to ask again. Many of the assignments require thought and problem solving, which takes "time on the calendar" not just "time on the clock".

By that I mean that spending an hour on 3 consecutive days is likely to be more productive than trying to spend 3 hours at once on the assignment.

Expected Amount of Work - My expectation is that an average student will spend about 5-10 hours OUTSIDE of class each week (that is in addition to class time or viewing lecture videos) WORKING PRODUCTIVELY/EFFICIENTLY (not just staring at the computer) to complete their coursework for this class. Some students may spend less time than this, and some students will spend more.

This is the foundation for the rest of CS, so it definitely pays off to do your best here.

Note - please find a way to spend enough time on this class (the investment will pay off in terms of skills, being able to get a job, etc.).

Grade Meanings - The letter grades are intended to have the following rough meaning. The list of achievements needed for each was chosen with this in mind.

- A+/A: You understand everything and probably could teach the course yourself.
- B+/A-: You understand nearly everything, and should be all set to use this knowledge in other courses or in a job.
- C/C+/B-/B: Some things you understand very well and others you don't (more towards the former for a B and more towards the latter for a C).
- D-/D+/C-: You did put some effort in, and understand many things at a high level, but you haven't mastered the details well enough to be able to use this knowledge in the future.
- F: Normally, students that get an F simply stopped doing the required work at some point.

CS-Specific Items

This section contains items that are generally the same for all CS courses (and in particular those taught by this instructor).

CS Course Policies

Note that this course follows all standard CS course policies. In particular, (a) cheating/plagiarism by graduate students results in an F in the course, (b) and there will be no makeup exams. See http://cs.indstate.edu/info/policies.html for details.

Lab Help

We have a few lab assistants who are available to help students in beginning computer science courses. Please see https://cs.indstate.edu/wiki/index.php/Unix_Lab_and_Help for details. The lab hours are in a calendar on the CS homepage, at http://cs.indstate.edu/info/index.php#lab_hours. You can join the lab when working on your programs. You can ask the lab assistants to look at your programs, and you can work with any other CS students that are there (you could use the lab as a regular meeting place to work with your classmates).

Course Announcements

Announcements regarding the course will be made both during class and via email to your @sycamores.indstate.edu email address. You should regularly check this email account or have it forwarded to an account that you check regularly. You can set the account to forward by logging into your indstate.edu email online (if you aren't able to find the option, try a different browser or search online for things like - outlook online forward email setting).

Classroom conduct

You may not use cell phones, iPods/music players, etc. during class. You should be civil and respectful to both the instructor and your classmates, and you should arrive to class a few minutes before the scheduled lecture so you are ready for lecture to begin on time. You may use your computer during class if you are using it to follow along with the examples that are being discussed. You should avoid spending time on email, Facebook, work on other courses, etc. during the lecture for this class (be fully present wherever you are, make the most of each experience).

Academic Integrity

Please follow these guidelines to avoid problems with academic misconduct in this course:

Homework: You may discuss the homework assignments, but should solve and finish them on your own. To make sure you are not violating this, if you discuss with someone, you should DESTROY any work or evidence of the discussion, go your separate ways, SPEND at least an hour doing something completely unrelated to the assignment, and then you should be able to RECREATE the program/solution on your own, then turn that in. If you cannot recreate the solution on your own, then it is not your work, and you should not turn it in.

Note on sources: if you use some other source, the web or whatever, you better cite it! Not doing so is plagiarism.

Exams: This should be clear no cheating during exams. Each instructor has different rules for what is allowed on exams in terms of notes, etc. If not noted otherwise, you should assume that a quiz or exam is closed notes, no computer, no calculator.

Projects: You should not copy from the Internet or anywhere else. The project should be your own work. It will be fairly obvious to me if you do copy code from the Internet, and the consequences will be at the least a 0 on the project. If cheating is observed, you will at the least receive a 0 for the assignment (and may receive an F for the course), and I will file a Notification of Academic Integrity Violation Report with Student Judicial Programs, as required by the university's policy on Academic Integrity. A student who is caught cheating twice (whether in a single course or different courses) is likely to be brought before the All University Court hearing panel, which can impose sanctions up to and including suspension/expulsion. See http://www.indstate.edu/sjp/docs/code.pdf and http://www.indstate.edu/academicintegrity/ for more information.

Please ask the instructor if you have doubts about what is considered cheating in this course.

Office hours (using Teams)

Office hours will be through Microsoft Teams by default. If you would like to meet in person you should reserve an appointment using http://cs.indstate.edu/scheduler to reserve an in person meeting with Jeff Kinne. I am normally in my office during my listed office hours, but by making an appointment you can be more certain. For meeting through Teams, you should start Teams in your browser or start the application. You should be logged in using your ISU credentials. Once you have Teams open you can message me to ask me questions or to ask to talk. We can use Teams to message (better than emailing back and forth repeatedly if you have questions about

something that you just want to write about) or to talk and share screens (e.g., to take a look at your code). I normally have Teams open on my computer all of the time, including during my office hours. During my office hours I will normally reply right away; at other times I will reply when I get a chance.

Canvas

The course has a canvas site. Click https://indstate.instructure.com/ to go to canvas. You should see this course listed under your courses for the current term. If you don't you may need to click on the Courses icon and then click the "All courses" link. The canvas site is used for giving you your grades, for quizzes/exams, and for getting to online lectures (which are done using Zoom). Announcements will be sent through canvas and to your university email. Links and such will be kept on this website.

Lectures (using Zoom)

Here at ISU section numbers starting with the number 3 (e.g.3xx: 301, 302, etc.) are generally online sections. There are 2 types of online sections, synchronous online and asynchronous online. Sections that are synchronous should be joined at the regularly scheduled time of the course, whereas sections that are asynchronous generally keep up with the material independently without regularly scheduled meetings. In general async sections are more difficult to stay on top of, and require a great deal of self-discipline (it is much easier to think "I can watch the videos tomorrow" and just get behind). So if you are in one of these sections make sure you get off to a strong start, and ask for help sooner rather than later. If you are in an online section, check your course schedule for course meeting times; if you have a meeting time, then your section is synchronous, otherwise it is asynchronous (or there is an error in the system).

This course has a 301 section (synchronous online) and 001 section (face to face). Students in either section can participate in whatever way you need to.

For ISU's links to information on getting started with Zoom, see https://indstate.teamdynamix.com/TDClient/1851/Portal/KB/ArticleDet?ID=107534. You can also see the information linked at https://www.indstate.edu/services/student-success/cfss. You will get to the lectures for this course by going to Canvas, select this course, click Modules on the menu on the left, and click on the Zoom module. Once there you should see a schedule of lectures and be able to view recorded lectures. Note that you should install the Zoom application for your computer, and you will need to be logged into to Zoom with your ISU credentials to be able to connect. Also note that the lectures are recorded and only available to those in our class. Recorded lectures normally appear later the same day as the lecture.

Note that if you have not used Zoom with your ISU account previously, you need to go to https://indstate-edu.zoom.us and login with your ISU email address and password to get it setup.

Participating online

If you are participating online, please see the information at https://www.indstate.edu/services/student-success/cfss about participating in online courses. You are expected to either join lectures live through Zoom or watch the recordings once they are available. You will complete assignments, quizzes, and exams on the same schedule as the rest of the class. For quizzes and exams you will normally have a 24 hour period during which to take the quiz/exam (note that different students will have slightly different questions and any communication between students about quiz/exam content is academic misconduct).

So also the General Information section at the top of this page for setting up a normal check-in time with the instructor.

ISU Required Syllabus Items

The items in this section are required and are the same for every ISU course.

COVID-19 Information

Information specific to CS courses - Start of Term Announcements

Standard ISU language required in all syllabi (read this all once, then skim for your other courses)...

Students are expected to adhere to course attendance policies, as stated in the course syllabus. Documented COVID-related absences will be treated like any other serious medical issue. Following University policy, students with a documented, serious medical issue must contact the Office of the Dean of Students for assistance. The Office of the Dean of Students will supply documentation for faculty. Students with a documented serious medical issue should not be penalized and will be given a reasonable chance to complete exams or assignments. Once notification is made, faculty will make reasonable efforts to accommodate the student's absence and will communicate that accommodation directly to the student. Please note that faculty are not required to accommodate a serious medical issue with virtual content options, like streaming or recorded lectures. To avoid the potential of missing significant class time, students are strongly encouraged to receive the COVID vaccination that has been made available on campus. For more information about the vaccines or to find a vaccination site, go to: https://ourshot.in.gov. The ISU Health Center also administers COVID-19 vaccines by appointment.

Students should contact the Office of the Dean of Students with questions by calling 812-237-3829.

The information provided in this section of the syllabus is subject to modification based on guidance by public health authorities. Changes to Covid-related policies or updated information will, as always, be posted on the ISU website and communicated in multiple ways.

Special Needs / Disability Services

Standard ISU language required in all syllabi...

Indiana State University recognizes that students with disabilities may have special needs that must be met to give them equal access to college programs and facilities. If you need course adaptations or accommodations because of a disability, please contact us as soon as possible in a confidential setting either after class or in my office. All conversations regarding your disability will be kept in strict confidence. Indiana State University's Student Support Services (SSS) office coordinates services for students with disabilities: documentation of a disability needs to be on file in that office before any accommodations can be provided. Student Support Services is located on the lower level of Normal Hall in the Center for Student Success and can be contacted at 812-237-2700, or you can visit the ISU website under A-Z, Disability Student Services and submit a Contact Form. Appointments to discuss accommodations with SSS staff members are encouraged.

Once a faculty member is notified by Student Support Services that a student is qualified to receive academic accommodations, a faculty member is obligated to provide or allow a reasonable classroom accommodation under ADA.

Disclosures Regarding Sexual Misconduct

Standard ISU language required in all syllabi...

Indiana State University Policy 923 strictly prohibits discrimination on the basis of: age, disability, genetic information, national origin, pregnancy, race/color, religion, sex, gender identity or expression, sexual orientation, veteran status, or any other class protected by federal and state statutes in ISU programs and activities or that interferes with the educational or workplace environment.

Title IX of the Educational Amendments of 1972 prohibits discrimination based on sex, including sexual harassment. Sexual harassment includes quid pro quo harassment, unwelcome verbal or physical conduct, sexual assault, dating violence, domestic violence, and stalking.

If you witness or experience any forms of the above discrimination, you may report to:

Office: Equal Opportunity & Title IX; (812) 237-8954; Rankin Hall, Room 426
Email: ISU-equalopportunity-titleix@mail.indstate.edu
Online: https://cm.maxient.com/reportingform.php?IndianaStateUniv&layout_id=10

Disclosures made to the following confidential campus resources will not be reported to the Office of Equal Opportunity and Title IX:
ISU Student Counseling Center: (812) 237-3939; Gillum Hall, 2nd Floor
Victim Advocate: (812) 237-3829; HMSU 7th Floor
UAP Clinic/ISU Health Center: (812) 237-3883; 567 N. 5th Street

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