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|  | Student Taught Courses (StuCo): Intro to Command-line Tools [98-212] |
| **Meeting Day:** Every Wednesday**Time:** 7 PM – 7:50 PM EST**Location:** WEH 5409 |
|  **Semester:** Spring **Year:** 2024 **Units:** 3 **Type:** Free Elective |

**Instructor(s) information**

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| **Name** | Jason Ledon |
| **Contact Info** | jledon@andrew.cmu.edu |
| **Office hours** | Scheduled on request |

# **Course Description**

* **Course Purpose**: The goal of this course is to make students more proficient working in the terminal and learn how to automate or speed up what might otherwise have been a very tedious, arduous task. These skills will help with work as a developer, as they can help solve real-world tasks. They also help during daily life with automating scriptable tasks.
* **Course Activities:** The course will include lecture notes hosted on the course website (<https://intro-to-cmdline-tools.jtledon.com/>), which will contain examples of some commands. It will also be set up to contain exercises that will encourage using the commands that are being taught in that lesson.
* **Prerequisites:** It is expected that students have at least some familiarity with Linux-based terminals; they should understand the basics of how to use sh/bash/zsh/dash/etc and be able to navigate around comfortably.
* **Class Structure:** The course will primarily be lecture based, with class activities that will be done independently or in pairs, depending on the exercise.

# **Learning Objectives**

* Become more proficient with reading the documentation for commands, so that even if you don’t know how to use it, you can figure it out yourself.
* Become proficient with git, far beyond just adding, committing, and pushing. Be able to easily navigate between branches, have multiple branches checked out at the same time, understand how git works under the hood, and become proficient at correcting mistakes and resolving back to past state.
* Learn how to use tmux to manage multiple screens running multiple processes at once. Also become comfortable using tmux as an easy way to start a process on a remote server and then detach to leave the process running.
* Learn various forms of text parsing, including searching files for certain contents, using regex and fuzzy-finding tools
* Learn how to chain various building-block commands together to automate data processing.
* Make command-line network requests and copy bulk files to and from a server.
* Learn about general, powerful utility commands such as parallel, tee, nohup, time and when they can speed up your dataflow
* Learn the basics of navigating vim, to at least become familiar enough to edit simple text, such as a commit message, in it.

# **Additional Materials**

* Laptop with the appropriate permissions to install software / command-line tools

# **Attendance Policies**

* Students are expected to attend every class. Students that have more than 2 unexcused absences will automatically fail the course. This is a strict policy. Students with legitimate reasons to miss class should inform the instructors in advance as soon as possible.
* Attendance will be taken though a google form using a link released in class, with a question about what was covered in that day’s content.
* Participation will be based on the exercise for the day and the response to the attendance question. Students will receive 4 points if they achieve the correct answer for the exercise, 3 points if they aren’t able to get the right answer but there is a genuine attempt made and I can see their thought process, and 0 points if there was no attempt made on the exercise.
* religious observance, illness, job interviews, and other reasonable requests count toward excused absences, but need to be submitted 6 hours or more prior to class.

# **Assessments**

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| **Assessment** | **Percentage of Final Grade** |
| Participation | 15% |
| Midterm | 20% |
| Final | 30% |
| Homework | 35% |

* **Midterm Description:** The midterm will be an individual take home task or set of tasks, that should be solved entirely using command-line tools; it will build upon the tools that were taught in class and the solutions will be submitted online.
* **Final Description:** The Final will be an individual take home task, similar to the midterm, but will be a task that contains multiple parts, and builds upon the previous content. The task can be accomplished however the student would like, so long as it is using command-line tools, and not a programming language; the intention is to use the skills that were built upon during class and homework assignments. The solutions to the Final will also be submitted online and is to be done alone.
* **Homework:** Homework’s will be based on the lecture content and will be similar to what will be on the exams. They will be small tasks that are intended to familiarize you with the tools. They should be individual lines of bash commands used to solve the assigned task. They should be done alone, but you can discuss possible approaches with other students in the class. It is okay to use online resources, as this is intended to reflect a real-life scenario of using these tools. It will be submitted online
* **Participation:** Seeing as I think you learn best by doing, a decent portion of the class grade will be based on showing up and participating.

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| **Grade** | **Percentage Interval** |
| P | 60-100% |
| R (F) | 0-59% |

# **Grading Policies**

* **Late-work policy**: Late work is accepted up to 7 days after the due date, with 10% taken off your final grade on the assignment for each additional day taken. This is available for every homework – except for the last – without need for requesting it.
* **Make-up work policy**: Work can be made up; students should notify me no later than 24 hours in advance. The permissible reasons consist of the same reasons for excused absences (religious observance, illness, job interview, or other reasonable purposes)
* **Re-grade policy**: There shouldn’t need to be any re-grading, as the work will be binary - either right or wrong. That being said, a regrade request can be submitted via email, within 14 days of receiving the grade.
* **Attendance and/or participation policy**: Attendance will be taken though a google form using a link released in class, with a question about what was covered in that day’s content. Participation will based on the exercise for the day and the response to the attendance question. Students will receive 4 points if they achieve the correct answer for the exercise, 3 points if they aren’t able to get the right answer but there is a genuine attempt made and I can see their thought process, and 0 points if there was no attempt made on the exercise.

# **Course Schedule**

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| **Date** | **Theme/Topic** | **Assignments Due [if applicable]** |
| 1/17/2024 | **Reading documentation**We will be learning about how to read through documentation and quickly find the information you are looking for | n/a |
| 1/24/2024 | **Intro to git**We will be learning about the basics of git, and how it works under the hood to get a more natural intuition of how it works and how to start getting more efficient when using it. | And emailed confirmation with proof that ssh keys have been setup and connected to your github, and that the class docker container is running is running on your machine of choice that you have access to. |
| 1/31/2024 | **Advanced git**We will be discussing and learning about more niche, but incredibly powerful git features. Having multiple branches checked out at once (worktrees), how to recover deleted commits (reflog), how to automate the prevention of bad commits (hooks) and more about the inner workings of git. | An online submission of the commands required to solve the git-intro task |
| 2/7/2024 | **Text manipulation and parsing**Learn how to use find, grep, sed, and awk to quickly find a file or string in a large swatch of data | An online submission of the commands required to solve the git-advanced task |
| 2/14/2024 | **Learning RegEx**Learn how to use one of the most powerful ways of searching for text | An online submission of an awk expression that processes text and outputs the required information. |
| 2/21/2024 | **Vim**This lecture will cover the basics of how to use vim: one of the most ubiquitous command-line editors on all linux distributions, which is incredibly useful for brief edits, or a full developer experience. | An online submission of a regular expression that will extract the information from the provided test data |
| 2/28/2024 | **Intro to TMUX and its benefits**Learn how to use a terminal window manager to organize ongoing tasks, and have processes running in detached processes. | A video of the student navigating around vim, and modifying text with relative confidence. |
| 3/13/2024 | **Configuring dotfiles**We will be learning about how to configure dotfiles for common linux tools, such as .profile, .bashrc, .vimrc, .gitconfig, .tmux.conf to customize them and store your config as code. | An online submission of a video file recording the student navigating around tmux moderately fluently.  |
| 3/20/2024 | **Chaining commands**Possibly the most important lecture in this course. This will cover how to chain various commands together using the building-block commands, to make a very powerful way of processing data. | An online submission of two of the common .dotfiles, configured to fit the students desires |
| 3/27/2024 | **Network requests**This will cover how to make network requests using the command-line, and the various ways of doing this, and each of their tradeoffs. | An online submission of a **one line** bash command that chains multiple commands together to solve the provided task. |
| 4/3/2024 | **Powerful tools**This lecture will cover powerful general purpose tools for speeding up tasks and general convenience. | An online submission of data that was extrated out of web files. There will be tens to hundreds of files that will be acquired from line which need processing. |
| 4/10/2024 | **bash scripting and environment variables**This lecture will cover some of the niche information required for bash scripting and managing linux environment variables | An online submission of using some of the powerful tools introduced to speed up or improve in some way, any one of the students previous homeworks. |
| 4/17/2024 | **File system management**This will cover managing system permissions, processes, available storage, and other important resources. | An online submission of a bash script, including functions or conditionals, as well as modifications to important environment variables, such as PATH. |
| 4/24/2024 | **Package managers, and developer environments (Docker)**This lecture will cover how to install other packages, and tools, how to manage them, and setting up customized development environments. | An online submission of multiple pieces of information acquired using various different file management tools |

***I might change the order or content of some of these classes depending on the timing of classes and student requests.***

# **Remote Teaching**

* There will be some combination of lecture notes and presentations released on the course website, but attending class synchronously is still intended.

# **Course Note**

**Academic Integrity & Collaboration**: *From CMU’s Policy on Academic Integrity:* In any manner of presentation, it is the responsibility of each student to produce her/his own original academic work. Collaboration or assistance on academic work to be graded is not permitted unless explicitly authorized by the course instructor(s). Students may utilize the assistance provided by Academic Development, the Global Communication Center, and the Academic Resource Center (CMU-Q) unless specifically prohibited by the course instructor(s). Any other sources of collaboration or assistance must be specifically authorized by the course instructor(s).

In all academic work to be graded, the citation of all sources is required. When collaboration or assistance is permitted by the course instructor(s) or when a student utilizes the services provided by Academic Development, the Global Communication Center, and the Academic Resource Center (CMU-Q), the acknowledgement of any collaboration or assistance is likewise required. This citation and acknowledgement must be incorporated into the work submitted and not separately or at a later point in time. Failure to do so is dishonest and is subject to disciplinary action.

Instructors have a duty to communicate their expectations including those specific to collaboration, assistance, citation and acknowledgement within each course. Students likewise have a duty to ensure that they understand and abide by the standards that apply in any course or academic activity. In the absence of such understanding, it is the student’s responsibility to seek additional information and clarification.

**Accommodations for students with disabilities**: If you have a disability and have an accommodations letter from the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at access@andrew.cmu.edu.

**Statement on student wellness**: This semester is unlike any other. We are all under a lot of stress and uncertainty at this time. Attending Zoom classes all day can take its toll on our mental health. Make sure to move regularly, eat well, and reach out to your support system or Judy Hallinen [hallinen@cmu.edu] if you need to. We can all benefit from support in times of stress, and this semester is no exception. If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help: call 412-268-2922 and visit their website athttp://www.cmu.edu/counseling/. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.

**Statement on Diversity, Equity, and Inclusion:** We must treat every individual with respect. We are diverse in many ways, and this diversity is fundamental to building and maintaining an equitable and inclusive campus community. Diversity can refer to multiple ways that we identify ourselves, including but not limited to race, color, national origin, language, sex, disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Each of these diverse identities, along with many others not mentioned here, shape the perspectives our students, faculty, and staff bring to our campus. We, at CMU, will work to promote diversity, equity and inclusion not only because diversity fuels excellence and innovation, but because we want to pursue justice. We acknowledge our imperfections while we also fully commit to the work, inside and outside of our classrooms, of building and sustaining a campus community that increasingly embraces these core values.

Each of us is responsible for creating a safer, more inclusive environment.

Unfortunately, incidents of bias or discrimination do occur, whether intentional or unintentional. They contribute to creating an unwelcoming environment for individuals and groups at the university. Therefore, the university encourages anyone who experiences or observes unfair or hostile treatment on the basis of identity to speak out for justice and support, within the moment of the incident or after the incident has passed. Anyone can share these experiences using the following resources:

* Center for Student Diversity and Inclusion: csdi@andrew.cmu.edu, (412) 268-2150
* Report-It online anonymous reporting platform: [reportit.net](http://reportit.net) username: tartans password: plaid

All reports will be documented and deliberated to determine if there should be any following actions. Regardless of incident type, the university will use all shared experiences to transform our campus climate to be more equitable and just.