Principles of Systems Programming
CSCE 3600.00 – Fall 2023
Regular Session Aug 21, 2023 - Dec 15, 2023

Instructor: Curtis Chambers
Office: T TH 12PM – 2PM (Room and Zoom Link: Check Canvas Page)
E-mail Address: Curtis.Chambers@unt.edu

Class Times:
Lecture (.002): MoWe 8:30AM - 9:50AM
NTDP D201
Aug 21, 2023 - Dec 15, 2023

Office Hours: TBD


Grader: TBD
TA: TBD

Contacting Requirements
When contacting the instructor or course assistance staff (TA, IA, etc.), the following is required:

- Sent from a UNT Provided email and/or Canvas Account
- Sent to my work email (above) OR through Canvas (preferred).
  - TA/IA Preferred Emails will be posted on Canvas.
- Must have the Course Number AND Section (i.e., 2110.212) in the Subject Line or appropriate field.
- Subject should be short and to the point.
- Body must be detailed, legible, and respectful.
- Please give at least:
  - 2 business days for a response via Canvas.
  - 3-4 business days for email.

Emails, messages, and the like that fail to remain in compliance with the above standards may impact efficiency of communication or (in the worst case) result in no reply.

Pay close attention to Canvas! Many times, I have received the same or similar message from multiple students. I will post on Canvas to address all participants in the course for what I find is a “collective concern.” Towards this, I also recommend that you check the Canvas Pages for your Lecture and Recitation prior to sending an email to make sure that it hasn’t been already addressed.

Recitation Schedule: You should have registered for one of the following groups.
CSCE 3600-211
CSCE 3600.002 – Principles of Systems Programming  Fall 2023

Mo 11:30AM - 12:20PM
NTDP B142

CSCE 3600-212

We 1:00PM - 1:50PM
NTDP B192

Canvas: This course will be using Canvas to distribute course materials, post grades, and submit assignments. Check regularly to course work and announcements.

Course Description

3600. Principles of Systems Programming. 3 hours (3;0;1).

Introduction to the design and operation of systems software. Analysis is made of current system software technology, including operating systems, language translation systems and file systems. Prerequisite(s): CSCE 2100 with a grade of C or better.

This course will focus on systems programming fundamentals: learning how computer system software works and improving skills in K&R C and bash (Bourne-again shell).

The course will include one or more major programming group projects and several smaller individual programming assignments. Recitation assignments will assist in reinforcing and applying material covered in lecture throughout the course. One or more midterm exams will assess your knowledge on the material with a final comprehensive exam at the end.

Course Outcomes

Course outcomes are measurable achievements to be accomplished by the completion of a course. These outcomes are evaluated as part of our ABET accreditation process.

1. Write robust, efficient, readable, and correct system software using the C programming language.

2. Demonstrate an understanding of processes and threads by developing applications using multiple processes and multi-threaded activities in a Linux environment.

3. Demonstrate an understanding of deadlocks and synchronization through the development of the application(s) that utilize a variety of mutual exclusion mechanisms.

4. Develop shell scripts and utilities that demonstrate an understanding of memory, file, and process management and interaction, including concepts such as virtual memory and disk scheduling.

5. Create a Linux-based application that utilizes inter-process communication mechanisms such as pipes and sockets to communicate information between independently running processes on one or multiple platforms.
6. Demonstrate an understanding of the use and interaction among compilers, macro processors, assemblers, linkers, and loaders through their use in creating the applications described in previous outcomes.

Course Requirements

**Attendance:** Required.

**Exams:** 2 Midterm Exams and 1 Final Comprehensive Exam.

**Grade:** The final grade for this class will be based on a sequence of recitation assignments, 4 minor (individual) programming assignments, 2 major (group) programming assignments, and 3 exams.

Attendance Policy Detailed

**Lecture Session:** Required.

Should you miss class, you are responsible for the covered course material and assignments you may have missed. The instructor will not be responsible for re-teaching material missed by a student who did not attend class.

As always, if there are extenuating circumstances, please notify your instructor and course assistance staff (such as Graders and TAs) via Canvas Message Feature and/or UNT Email ASAP so that you can work together to ensure your success in learning the material.

Note that the Graders and TAs should only be notified. Do not expect a response from them outright.

**Recitation Sections:** Required.

Recitation is (generally) considered optional. I, however, require that you attend recitation. Recitation will cover recitation (graded) assignments, minor, and major assignments. We’ll also cover exam preparation in recitation. While in recitation you can use your time as you see fit, but respect and follow the TA’s instructions.

Recitation Assignments will be distributed during Recitation Hours of your grade but should be accessible on Canvas.

**Accommodations:**

THIS DOES NOT APPLY TO ODA ACCOMODATIONS. (These are processed through the ODA Offices)

Should you want me to provide accommodations (such as make up work) for an unavoidable absence or impact, you must use this process:

1. Email me and your assigned TAs/IAs from your UNT email.

This is to notify us about the absence pending an excused document from the Dean of Students Offices.

2. Contact the Student Affairs Office.
   
   Email: DEANOFSTUDENTS@UNT.EDU
   
   Phone: 940-565-2648
Note that the DoS offices only request accommodations and do not enforce it. Work with them to verify the validity of the excused absence or impact. Once their offices process the details with you, they should provide you with a document and/or contact me. Should you get a document, send it to me via email and keep the physical copy for your records.

I’ll need these document(s) before I can provide accommodation. This process will keep us both in compliance with UNT standards, practices, policies, and procedures while being the most efficient and private method.

If you have questions, please visit me during my office hours or schedule a meeting with me.

### Academic Misconduct & Integrity

- This course follows UNT’s policy for Student Academic Integrity that can be found at https://policy.unt.edu/policy/06-003 as well as the Cheating Policy for the Department of Computer Science and Engineering.
- The department, college, and university have very strict guidelines regarding academic misconduct. Students are expected to submit their own work on all individual assignments.
- You are allowed to discuss solutions, but do NOT work with other students on shared program/assignment solutions. Do NOT use even partial program solutions from the Internet without properly citing them. Do NOT recycle a complete assignment, this will result in a failing grade. The complexity of these assignments should not merit the use of external resources. Failure to remain in compliance with the guidelines is considered cheating and will be reported.
- **You will be graded on your contribution to the code.** Be honest—attribute your work. Submitting code or work that you did not solely author (without acknowledging it to the instructor) is cheating and will be dealt with in accordance with the department cheating policy.
- If it is determined that you have cheated, the first instance of cheating in the class will result in a grade of ZERO (0) on the assignment in question and referral to the department chairman and dean of engineering. The second instance of cheating in the class will result in a grade of F in the class, and a dismissal hearing may be initiated by the dean of engineering.
- **You need to do your own work.** Here, there should be no ambiguity at all.
- In case the above description, and in-class discussion of my views on appropriate and inappropriate collaboration does not answer all your questions, please look at the university Student Rights and Responsibilities web page.
- You are responsible for the information covered in class, whether you attend class or not. Individualized lectures will not be given. Please check with other class members for any notes that might have been missed during an absence. Attendance won’t always be taken in lecture and your attendance is strongly recommended to improve your opportunity to meet course objectives.
- This course will contain both group and individual assignments.
- On major programming assignments, you are to work in a group as directed by your instructor.
- Minor programming assignments must be the sole work of the individual student.
- You should not work with other students on shared program solutions or use program solutions found on the Internet.
• Specifically, you should **never copy someone else’s solution or code**, and **never let a classmate examine your code**.
• A sophisticated program will be used to compare your work to the work of all other students (including students in past classes).
• If you are having trouble with an assignment, please consult with your instructor or course assistance staff (TAs, IAs, Graders, etc.). Failure to adhere to these strict standards may be cause for disciplinary action even leading to expulsion from the University.
• Each student should adhere to the university's student code of conduct. The Code of Student Conduct can be found at [http://deanofstudents.unt.edu](http://deanofstudents.unt.edu).

**Student Responsibilities**

Students are responsible for submitting the **correct assignments** for each applicable assignment submission. Submissions should include the **correct files** and submitted **prior to the deadline**. In certain cases, when an assignment is verified to be completed on time, but either was submitted to an incorrect assignment location (e.g., submitting Minor 5 to Minor 4 location on Canvas) or a wrong assignment was submitted instead, the assignment may be accepted, but **assessed a 30% reduction penalty** if the due date has passed. Verification of completion time stamp for assignments will be done using the **CSE machines**, so please make sure to save your work on these departmental servers to ensure that your work can be accepted. If you have any questions or concerns about your submission, please work with your instructor or TA/IA to ensure the correct file(s) is/are submitted.

**Excused Absences Defined**

Students are expected to schedule routine appointments and activities so as not to conflict with attending class. However, some absences cannot be prevented. In the event of a medical emergency or family death, etc., students must request an excused absence as quickly as feasible following the event. While it is preferred that I am notified prior to the event, that cannot always be the case. Send to me **(ASAP)** a brief email from your **UNT provided email address**. You need not go into detail as to the emergency, but you should schedule with me a meeting outside of lecture at your earliest convenience. Students must be able to provide documentation that verifies the reasoning for the excused absence. Above all else, this course is compliant with UNT Policy 06.039 “Student Attendance and Authorized Absences.” Please refer to this policy for more details/information.

**Refer to the section “Contact Requirements” and subsection “Accommodations.”**

**Emergencies**

By definition, emergencies cannot be planned for. Your instructor attempts to make accommodations in these instances that allow for making up missed work and completion of the course in a timely manner. Students must provide documentation that verifies the emergency.

**Refer to the section “Contact Requirements” and subsection “Accommodations.”**

**Disability Accommodation**
The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time; however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation.

Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the Office of Disability Accommodation website at http://www.unt.edu/oda. You may also contact ODA by phone at (940) 565-4323.

Academic Integrity

Below I have taken out two paragraphs from UNT Policy 06.003 Student Academic Integrity.

“UNT promotes the integrity of learning processed and embraces the core values of trust and honesty. Academic integrity is based on educational principles and procedures that protect the rights of all participants in the educational process and validate the legitimacy of degrees awarded by the university. In the investigation and resolution of allegations of student academic dishonesty, the university’s actions are intended to be corrective, educationally sound, fundamentally fair, and based on reliable evidence.”

“Students are expected to conduct themselves in a manner consistent with the university's status as an institution of higher education. In the class setting, students shall follow their instructors’ directions and observe all academic requirements published in course syllabi and other course materials. A student is responsible for responding to an academic dishonesty report issued by an instructor or other university official. If a student fails to respond after proper attempt at notification, the university may take appropriate academic actions in the absence of the student.”

UNT policy 06.003 defines the following breaches of academic integrity:

1. **Cheating.** The use of unauthorized assistance in an academic exercise, including but not limited to:
   1. use of any unauthorized assistance to take exams, tests, quizzes or other assessments;
   2. usage of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; usage without permission, of tests, notes, or other academic materials belonging to instructors, staff members, or other students of the university;
   3. dual submission of a paper or project, or resubmission of a paper or project to a different class without express permission from the instructor;
4. any other act designed to give a student an unfair advantage on an academic assignment.

2. **Plagiarism.** Use of another’s thoughts or words without proper attribution in any academic exercise, regardless of the student’s intent, including but not limited to:
   
   1. the knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgement or citation.
   
   2. the knowing or negligent unacknowledged use of materials prepared by another person or by an agency engaged in selling term papers or other academic materials.

3. **Forgery.** Altering a score, grade or official academic university record; or forging the signature of an instructor or other student.

4. **Fabrication.** Falsifying or inventing any information, data or research as part of an academic exercise.

5. **Facilitating Academic Dishonesty.** Helping or assisting another in the commission of academic dishonesty.

6. **Sabotage.** Acting to prevent others from completing their work or willfully disrupting the academic work of others.

**Cheating of any sort will not be tolerated in this course.** All submissions must be your own original work. Taking information or code from the internet or other students is considered a breach of academic integrity. Failure to adhere to these strict standards will be cause for disciplinary action that could be as severe as expulsion from the university. If it is determined a student cheated on any assignment in this course they will receive an F for their final course grade and an academic integrity report will be filed with the Office of Academic Integrity.

Further, UNT is now maintaining a database recording any acts of academic dishonesty that is available to employers. Additionally, because these are group projects, if one group member is caught cheating the consequences of their actions will extend to the group (as a whole). It is the responsibility of all group members to ensure that when they put their names on their submission as a whole and submit it, the submission does not contain any instances of cheating. Failure to report known instances of cheating within a group will be deemed facilitation of academic dishonesty and reported as such. For more information see the UNT Student Academic Integrity Policy.

**Collaboration Policy:**

For each project submission, all work is expected to be your own. While you should be working with your group members, you are not to collaborate with other groups for projects, provide solutions to other groups, search for solutions on the internet, or purchase solutions. Doing so will be deemed a breach of academic integrity. However, for any non-graded, practice assignments students are encouraged to work together to solve problems.
Academic Freedom and Academic Responsibility

Refer to UNT Policy 06.035

Academic freedom and academic responsibility give vitality to the UNT and its mission. As such, the academic freedom to be able to freely consider or investigate important, and, perhaps, controversial questions are essential to the education of students and advancement of knowledge. Faculty have the academic responsibility to subject their knowledge and postulates to rigorous review by peers who are experts in the relevant subject material, to have a firm foundation of their postulates in the most relevant and suitable available evidence, and to work with one another to provide the best education possible for our students.

Syllabus Revisions

This syllabus may be modified as the course progresses should the instructor deem it necessary. Notice of changes to the syllabus shall be made through Canvas and/or class announcements.

Tentative Lecture Schedule (subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Systems Programming Overview</td>
</tr>
<tr>
<td>2</td>
<td>Linux Overview / Gitlab</td>
</tr>
<tr>
<td>3</td>
<td>Regular Expressions, sed/gawk</td>
</tr>
<tr>
<td>4</td>
<td>sed/gawk, Bash</td>
</tr>
<tr>
<td>5</td>
<td>Bash, Review</td>
</tr>
<tr>
<td>6</td>
<td>Processes</td>
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<tr>
<td>7</td>
<td>Processes</td>
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<tr>
<td>8</td>
<td>Threads</td>
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<tr>
<td>9</td>
<td>Threads, IPC</td>
</tr>
<tr>
<td>10</td>
<td>IPC, Review</td>
</tr>
<tr>
<td>11</td>
<td>IPC</td>
</tr>
<tr>
<td>12</td>
<td>IPC</td>
</tr>
<tr>
<td>13</td>
<td>Compilers &amp; Compilation</td>
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<tr>
<td>14</td>
<td>Python</td>
</tr>
<tr>
<td>15</td>
<td>Python, Review</td>
</tr>
<tr>
<td>16</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

Grading Policy

You must complete all tasks required on time. Late assignments will not be accepted without appropriate excused documentation. You have 1 week to dispute a grade after it’s posted date.

After receiving your grade for an assignment, you must email the grader (TA or IA) and myself within 7 days should you wish to discuss/dispute it. I recommend that you email me and CC the TA and Grader.
The above is to avoid “end of the semester” rush to alter grade penalties. Each student should keep track of their grades **throughout the semester**. Note that as we near the end of the semester, the time to adjust assignments gets shorter.

Each assignment will have varying requirements. **Pay very close attention** to what I am asking you to deliver in every assignment, program, and exam. Uploads may be on SVN, Canvas, GitLab, in person, or (in many cases) more than one.

Your final grade will be a weighted average according to the following:

<table>
<thead>
<tr>
<th>Assignment Type</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recitation Assignments</td>
<td>15%</td>
</tr>
<tr>
<td>Minor Programming Assignments</td>
<td>25%</td>
</tr>
<tr>
<td>Major Programming Assignments</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Exams 1 – 2</td>
<td>25% (or 12.5% each)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>15%</td>
</tr>
</tbody>
</table>

Letter grading system: A (90+), B (80+), C (70+), D (60+), F(0+)

Grades will be posted on Canvas throughout the semester to provide an ongoing assessment of student progress, though final assessment will be measured using the weighted average above.

**Once a grade is assigned on Canvas, students have one (1) week to dispute the grade.** The proper channel for grade disputes is to first go to the original grader (i.e., TA/IA) to resolve the issue (**don’t forget to include me in the email so I may monitor the exchange**). If, however, a resolution cannot be reached between the student and the grader, the student shall then go to the instructor who will have the final say on the grade.

Most assignments will be due at 11:59 PM on the specified due date to Canvas. All assignments must be completed and submitted according to their specific directives. Programming assignments will be accepted up to 24 hours late and assessed a **50% grade reduction penalty**. Any programming assignment submitted more than 24 hours late **will not be accepted and receive a grade of 0**.

**Recitation Assignments**: Recitation assignments are meant to serve as preparatory assignments for upcoming minor and major assignments that can be completed in a relatively short amount of time. Students may complete these assignments on their own or by attending their scheduled recitation where they may receive guidance from a TA/IA on completing. **No late recitation assignments will be accepted.**

**Minor Programming Assignments**: Minor programming assignments will be assigned based on the material from the lectures and textbook. These are meant to be individual programming assignments, so you should **work on these alone** unless explicitly directed otherwise by your instructor.

**Major Programming Assignments**: Major programming assignments will be **worked on in a group** and are meant to be more comprehensive problem-solving exercises based on the material from the lectures and textbook.

**Midterm Exams**: There will be two midterm examinations given in this course. The dates of these exams will be posted on Canvas and announced in class at least one week prior to the date of the exams. A make-up exam will be given at the discretion of the instructor when a student misses an exam with an
excused absence. Unexcused absences on the date of an exam may result in a grade of 0 for the missed exam, so every effort should be made to attend class on the day of a scheduled exam. The exam is close-book and close-note.

**Final Exam:** There will be a comprehensive final exam at the end of the semester. Exams will meet at the same time and location assigned to the class unless other arrangements have been made. All students are expected to take the final exam during the scheduled time.

**Exam Grading Policy:**

By the end of the course, you must have earned **at least a 60% average from the exams.** Failure to do so will result in a **final grade of an F,** despite having a potentially passing course average. Additionally, if there are questions about posted grades, they must be discussed with the instructor **within two weeks** of the grades being posted. After two weeks, barring an exceptional circumstance, grades will not be altered.