CS 218: Assembly Language and Systems Programming
Fall 2022
Section 1001 & 1002

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Catalog Description
Algorithms from systems programming including conversion, buffering, device drivers, assemblers, and loaders. Use of system services, macros, and linkage conventions. Laboratory exercises programmed in assembly language. Prerequisites**:** CS 202 - Computer Science II. 3 credits.

Required Text:
   x86 Assembly Language Programming with Ubuntu (free, PDF)
   MIPS Assembly Language Programming with QtSpim (free, PDF)

Student Learning Outcomes (SLOs) Covered by This Course
   • **Objective 2**: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

     ○ **Objective 2: Specific Course Objectives and Expected Learning Outcomes**
       Upon completion of CS 218, students will be able to:
       ▪ Understand and evaluate the basic tool chain (compiler/assembler, linker, loader)
       ▪ Develop algorithmic solutions to problems and translate their algorithms into programs that meet a provided set of specifications
       ▪ Demonstrate and use good programming style and adequately document programs
       ▪ Understand and evaluate CISC/RISC concepts and architectural issues (data representation, machine registers, memory, secondary storage, bus, etc.) for computer based systems
       ▪ Operating System (OS) interaction techniques including system services, standard calling convention, security implication, and I/O issues for current computer-based systems

Prerequisites
To qualify for this course you must have earned a C or better in CS 202 (Computer Science II).

Grading

Grades will be based on following:

Homework/Worksheets	45%
Tests	45%
Final Exam	10%

Grades will be posted throughout the semester.
Grading is as follows:

A	A-	B+	B	B-	C+	C	C-	D	F
>93	93-90	89-87	86-84	83-80	79-77	76-74	73-70	69-60	<59

There will be numerous quizzes given throughout the semester. There is NO MAKEUP for missed worksheets. Worksheet scores will be counted with the homework scores.

Graded assignments will be returned to you as soon as possible. It is you're responsibility to check the grade summaries for posting errors. Any score issues must be identified to the instructor with three (3) classes. Scores are final after that. Late submissions will be accepted for a period of 24 hours after the due date/time for any given lab. For assignments, late submissions will be subject to a ~2% reduction in points per an hour late. If you submit 1 minute - 1 hour late -2%, 1-2 hours late -4%, … , 23-24 hours late -50%. This means after 24 hours late submissions will receive an automatic 0.

Three (3) tests will be given during the semester. Each test will be somewhat comprehensive, but will strongly emphasize material covered since the last test. Tests will be announced two or three class days in advance. There will be NO MAKEUP for missed tests.

Attendance Policy

Attendance is required in this class. Per UNLV policy, students who do not attend the first two classes of the semester will be dropped from the class. Students with three unexcused absences during the semester will receive a F in the class and not be permitted to participate further in the class.

Assignments

There will be numerous worksheets/assignments/homework given throughout the semester. There is NO MAKEUP for any of these if they are missed. Worksheets, homework and assignments scores will be counted as assignment points.

Graded assignments will be returned to you as soon as possible. It is you're responsibility to check the grade summaries for posting errors. Any score issues must be identified to the instructor within two classes. Score are final after that.

Three tests will be given during the semester, including the final exam. Each test will be somewhat comprehensive, but will strongly emphasize material covered since the last test. Tests will be announced two or three class days in advance. Tests may be administered in person or via Canvas using the Respondus Lockdown Browser and may require video monitoring during the exam. The method of testing is determined by the instructor. There will be NO MAKEUP for missed tests.

Tentative Schedule:
The tentative schedule is shown below.

CS 218 Syllabus	
Week	
1	Introduction, Architecture Overview Tool Chain Usage (assembler/linker/debugger) Data Representation (integer, float, characters)
2	Instruction Set Overview Addressing Modes
3	Stack Instructions / Stack Implementation Macro's
4	Functions Linkage and Argument Transmission
5	**Test #1** System Services - Introduction
6	Tool Chain Functions → Assembler / Linker / Loader Functions (continued) Stack Dynamic Variables Security Issues: Buffer Overflow Exploit, Code Injection
7	Command Line Arguments Floating Point Co-Processor Operations
8	System Services (I/O, file I/O, etc.) Buffering
9	Buffered I/O OS Interrupt Processing Interrupts and Exceptions Device Drivers
10	Threading and Race Conditions **Test #2**
11	MIPS Architecture Instruction Set Overview
12	Addressing Modes Stack Instructions, Stack Implementation
13	Functions, Recursion Multi-Dimension Arrays
14	**Test #3**
15	RISC vs CISC Caching / Pipelining / Virtual Memory
16	**Final Exam**

Department of Computer Science Academic Integrity Policy
Each student enrolled in a course offered by the Department of Computer Science is expected to do their own work when preparing written or programming assignments, as well as, examinations. Students must adhere to the academic integrity policy provided by the instructor and the university. It is also each student's responsibility to notify the instructor if they becomes aware of any activities that would violate the academic integrity policy of the class.

Permitted Sites on the Web
Students may use the permitted websites for **assistance in this class**. All other sites should not be used for assistance in this class. Instructors may provide additional links in assignment instructions or on the class WebCampus/Canvas website. All other sites should not be used, and their use may be treated as academic misconduct.

Permitted websites
- https://cplusplus.com
- https://en.cppreference.com/w/cpp
- The official UNLV WebCampus/Canvas site for your class
- The official UNLV Discord site for class.
  - Discord sites that are not the official site should not be used. Discussion boards and/or social media sites should not be used unless they are specifically approved by the instructor. **All others websites may not be used.**

Assistance that is allowed in the preparation of coursework:
- information/code provided in the textbook
- information/code provided in the class notes (on the WebCampus/Canvas website)
- assistance provided by course instructor
- assistance provided by the College of Engineering Tutoring Center (as long as the tutor is not writing the code)
- assistance provided on the official Discord site by the instructor, other instructors of different sections, and teaching assistants for the class
- websites on the permitted list

Examples of **prohibited practices include, but are not limited to**:
- copying answers/code from a fellow student, friend, relative
- providing answers/code to a fellow student
- collaborating (sharing) answers/code
- using the Internet to develop a strategy for solving a problem (finding an algorithm)
- using the Internet to solicit a solution to an assignment
- asking and/or paying someone to complete your assignments
- creating/using a non-instructor provided social media site

Consequences of violating the academic policy:
- an Alleged Academic Misconduct Report will be completed and a copy sent to the Office of Student Conduct, (OSC)
- A penalty will be assessed to all students involved. Penalties may range from a zero on the assignment up to a F in the class, with no additional participation in class allowed. Penalties are at the discretion of the instructor, but most times the penalty will be the most sever and result in a F in the class.

Class Rules
1. All students are expected to do their own work on exercises, assignments and examinations.
2. All assignments must be submitted via the class web page on WebCampus/Canvas. Assignments will not be accepted via e-mail or hard-copy.
3. All programs must be submitted for CodeGrade automated grading. CodeGrade uses the Ubuntu Linux operating system.
4. Check the class WebCampus/Canvas web page for announcements on a regular basis. Students can configure Canvas to notify students via e-mail when announcements are posted. Contact the UNLV OIT help desk for assistance configuring WebCampus.
5. Attendance is required in this class. Per UNLV policy, students who do not attend the first two classes of the semester will be dropped from the class. Students with three unexcused absences during the semester will receive a F in the class and not be permitted to participate further in the class.

University Policies

Public Health Directives
Face coverings are currently optional for all faculty and students in the classroom. Students must follow all active UNLV public health directives while enrolled in this class. UNLV public health directives are found at Health Requirements for Returning to Campus, https://www.unlv.edu/coronavirus/health-requirements. Students who do not comply with these directives may be asked to leave the classroom. Refusal to follow the guidelines may result in further disciplinary action according to the UNLV Student Conduct Code, https://www.unlv.edu/sites/default/files/page_files/27/StudentConduct-Code.pdf, including being administratively withdrawn from the course.

Academic Misconduct
Academic integrity is a legitimate concern for every member of the University community. We all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility, and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy, and are encouraged to always take the ethical path whenever faced with choices. Students enrolling at UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's educational mission. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another person, from the Internet or any other source without proper citation of the source(s). See the Student Conduct Code, https://www.unlv.edu/studentconduct/student-conduct.

Auditing a Course
Auditing a course allows a student to continue attending the lectures and/or laboratories and discussion sessions associated with the course, but the student will not earn a grade for any component of the course. Students who audit a course receive the same educational experience as students taking the course for a grade, but will be excused from exams, assessments, and other evaluative measures that serve the primary purpose of assigning a grade.

Classroom Conduct
Students have a responsibility to conduct themselves in class and in the libraries in ways that do not interfere with the rights of other students to learn, or of instructors to teach. Use of devices such as cellular phones and pagers, or other potentially disruptive activities are only permitted with the prior

explicit consent of the instructor. Students are specifically prohibited to record classes without instructor authorization, including online/remote classes (either audio only, or video and audio). The instructor may rescind permission at any time during the class. If a student does not comply with established requirements or obstructs the functioning of the class, the instructor may initiate an administrative withdrawal of the student from the course. Since the COVID-19 pandemic forced some instruction to be delivered remotely starting in Spring 2020, numerous students have asked instructors to record their synchronous classes, so that they can access them at their convenience. Instructors who agree to record their classes (audio only, or video and audio) should inform students in advance. Recorded lectures may not be broadly released to anyone, but made available exclusively to those students enrolled in the class during the particular academic term. Recorded lectures must be stored securely, and are subject to the Nevada System of Higher Education's Records Retention Policy, meaning that the recordings can only be deleted 120 days after the end of class (i.e., after grades are posted). Once this requirement is met, the recordings should be deleted. Class recordings are protected from disclosure, as they are deemed part of an educational record under the Family Educational Rights and Privacy Act (FERPA).

Copyright
The University requires all members of the University Community to familiarize themselves with, and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The University will neither protect nor defend you, nor assume any responsibility for student or employee violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional copyright policy information is available at https://www.unlv.edu/provost/copyright.

Disability Resource Center (DRC)
The UNLV Disability Resource Center (Student Services Complex, SSC-A, Room 143, https://www.unlv.edu/drc, telephone 702-895-0866) provides resources for students with disabilities. Students who believe that they may need academic accommodations due to a permanent disability, temporary or permanent medical need, or academic support due to pregnancy are encouraged to contact the DRC as early as possible in the academic term. A Disabilities Specialist will discuss what options may be available to you. Students who are already registered with the DRC should request their accommodations online each semester, and make an appointment to discuss their accommodations with their instructors.

Final Examinations
The University requires that final exams given at the end of a course occur on the date and at the time specified in the Final Exam schedule. The Final Exam schedule is typically available at the start of the semester, and the classroom locations are available approximately one month before the end of the semester. See the Final Exam Schedule, https://www.unlv.edu/registrar/calendars.

Identity Verification and Online Course Requirements
All UNLV students must use their Campus-issued ACE ID and password to log in to WebCampus-Canvas. UNLV students enrolled in online or hybrid courses are expected to read and adhere to the Student Academic Misconduct Policy, https://www.unlv.edu/studentconduct/misconduct/policy, which states that "acting or attempting to act as a substitute for another, or using or attempting to use a substitute, in any academic evaluation or assignment" is a form of academic misconduct. Intentionally sharing ACE login credentials with another person may be considered an attempt to use a substitute, and could result in investigation and sanctions, as outlined in the Student Academic Misconduct Policy.

UNLV students enrolled in online courses are also expected to read and adhere to the Acceptable Use of Computing and Information Technology Resources Policy, https://www.it.unlv.edu/policies/acceptable-use-computing-and-information-technology-resources-policy, which prohibits sharing university accounts with other persons without authorization. To the greatest extent possible, all graded assignments and assessments in UNLV online courses should be hosted in WebCampus-Canvas or another UNLV-managed platform that requires ACE login credentials for access.

Incomplete Grades
The grade of "I" (Incomplete) may be granted when a student has satisfactorily completed three-fourths of course work for that semester/session, but cannot complete the last part of the course for reason(s) beyond the student's control and acceptable to the instructor, and the instructor believes that the student can finish the course without repeating it. For undergraduate courses, the incomplete work must be made up before the end of the following regular semester. Graduate students receiving "I" grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the period indicated, a grade of "F" will be recorded, and the student's GPA will be adjusted accordingly. Students who are fulfilling an Incomplete grade do not register for the course, but make individual arrangements with the instructor who assigned the "I" grade.

Library Resources
Librarians are available to consult with students on research needs, including developing research topics, finding information, and evaluating sources. To make an appointment with a subject expert for this class, please visit the Libraries' Research Consultation website, https://guides.library.unlv.edu/appointments/librarian. You can also ask the library staff questions via chat and text message at https://ask.library.unlv.edu/.

Missed Classwork
Any student missing class, quizzes, examinations, or any other class or laboratory work because of observance of religious holidays will be given an opportunity during that semester to make up the missed work. The make-up opportunity will apply to the religious holiday absence only. It is the responsibility of the student to notify the instructor within the first 14 calendar days of the course for Fall and Spring courses (except for modular courses), or within the first 7 calendar days of the course for Summer and modular courses, of their intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit the Missed Classwork policy, under Registration Policies, on the Academic Policies web page, https://catalog.unlv.edu/content.php?catoid=39&navoid=10666.

In accordance with the policy approved by the Faculty Senate regarding missed class time and assignments, students who represent UNLV in any official extracurricular activity will also have the opportunity to make up assignments, provided that the student submits official written notification to the instructor no less than one week prior to the missed class(es).

The spirit and intent of the policy for missed classwork is to offer fair and equitable assessment opportunities to all students, including those representing the University in extracurricular activities. Instructors should consider, for example, that in courses which offer a "Drop one" option for the lowest assignment, quiz, or exam, assigning the student a grade of zero for an excused absence for extracurricular activity is both contrary to the intent of the Faculty Senate's policy, and an infringement on the student's right to complete all work for the course. This policy will not apply in the event that

completing the assignment or administering the examination at an alternate time would impose an undue hardship on the instructor or the University that could be reasonably avoided. There should be a good faith effort by both the instructor and the student to agree to a reasonable resolution. When disagreements regarding this policy arise, decisions can be appealed to the Department Chair/School Director, College/School Dean, and/or the Faculty Senate Academic Standards Committee. For purposes of definition, extracurricular activities may include, but are not limited to academic recruitment activities, competitive intercollegiate athletics, fine arts activities, liberal arts competitions, science and engineering competitions, and any other event or activity sanctioned by a College/School Dean, and/or by the Executive Vice President and Provost.

Rebelmail
Rebelmail is UNLV's official email system for students and by University policy, instructors and staff should only send emails to students' Rebelmail accounts. Rebelmail is one of the primary ways in which students receive official University communications, information about deadlines, major Campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the University. Sending emails within WebCampus-Canvas is also acceptable.

Title IX
UNLV is committed to providing an environment free of all forms of unlawful discrimination including sexual and gender-based discrimination, harassment, and violence like sexual assault, intimate partner violence, and stalking. If you, or someone you know, has experienced or is experiencing these types of behaviors, know that you are not alone. Resources and support are available. To learn more or to report an incident, please visit the Office of Equal Employment and Title IX website at https://www.unlv.edu/compliance. Please be aware that as an instructor, I am not a confidential resource, and I will need to report incidents of sexual misconduct to UNLV's Title IX Coordinator. You can also report concerns directly using the online reporting form, at https://cm.maxient.com/reportingform.php?UnivofNevadaLasVegas&layout_id=18 , or via email at titleixcoordinator@unlv.edu or 702-895-4055. For confidential support in matters of sexual violence, relationship/family violence, or stalking, contact the Care Center at https://www.unlv.edu/carecenter or 702-895-0602.

Tutoring and Coaching
The Academic Success Center (ASC), at the Claude I. Howard Building, provides tutoring, academic success coaching, and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, please visit the ASC website, https://www.unlv.edu/asc, or call 702-895-3177. The ASC is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A, Room 254. Drop-in tutoring is located on the second floor of the Lied Library, and on the second floor of the College of Engineering building (TBE A 207).

UNLV Writing Center
One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, https://writingcenter.unlv.edu/, located in the Central Desert Complex, Building 3, Room 301 (CDC3–301). Walk-in consultations are sometimes available, but students with appointments receive priority assistance. Students may make appointments in person or by calling the Center, telephone 702-895-3908. Students are requested to bring to their appointments their Rebel ID Card, a copy of the instructions for their assignment, and two copies of any writing they have completed on their assignment.

988 FREE 24/7 SUICIDE & CRISIS LIFELINE

In addition to campus resources such as the Counseling and Psychological Services (CAPS) website at https://www.unlv.edu/caps , visiting the YOU@UNLV website at https://you.unlv.edu/ , and Early Alert (for graduate students, at https://www.unlv.edu/graduatecollege/academy/early-alert), you may now call or text 988 or chat at 988lifeline.org if you or someone you know is in crisis and in need of support.

OPTIONAL BUT RECOMMENDED STATEMENTS FOR INCLUSION:

Diversity Statement

As an institution of higher learning, UNLV represents a rich diversity of human beings among its faculty, staff, and students, and is committed to aspiring to maintain a Campus environment that values that diversity. Accordingly, the University supports understanding and appreciation of all members of its community, regardless of race, sex, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, gender, gender identity, marital status, pregnancy, genetic information, veteran status, or political affiliation. Please see University Statements and Compliance, https://www.unlv.edu/about/statements-compliance.

A successful learning experience requires mutual respect and trust between the students and the instructor. Accordingly, the instructor asks that students be willing to listen to one another's points of view, acknowledging that there may be disagreements, keep discussion and comments on topic, and use first person, positive language when expressing their perspectives.

UNLV Land Acknowledgement

UNLV is situated on the traditional homelands of Indigenous groups, including the Nuwu or Nuwuvi, Southern Paiute People, descendants of the Tudinu, or Desert People. We honor and offer gratitude for those who have stewarded the land; for the land itself; and for the opportunity to cultivate a thriving, diverse, inclusive, and just scholarly community here today that works for a better tomorrow for all.