UW – Madison CS354 Syllabus Spring 2024

Institution Name: University of Wisconsin - Madison
Course: Computer Science 354 Machine Organization and Programming
Credits: 3
Canvas URL for lectures (001 and 002): https://canvas.wisc.edu/courses/382145

Course Designations and Attributes:

Gen Ed - Quantitative Reasoning Part B

Breadth - Natural Science,

Level – Intermediate,

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Course Description

An introduction to fundamental structures of computer systems and the C programming language with a focus on the low-level interrelationships and impacts on performance. Topics include the virtual address space and virtual memory, the heap and dynamic memory management, the memory hierarchy and caching, assembly language and the stack, communication and interrupts/signals, assemblers/linkers and compiling.

Prerequisites

E C E/COMP SCI 252 and (COMP SCI 300 or 302) or graduate/professional standing or declared in the Capstone Certificate in Computer Sciences for Professionals as approved through governance, presented in the Guide.

Meeting Time and Location:

(001) TR 9:30-10:45AM, Room 1220 Microbial Sciences

(002) TR 2:30-3:45PM, Room 125 Agriculture Hall

Lectures will be Live Streamed. Lecture recordings may be available for a short time.

Selected topic or examples may be recorded and available for longer periods.

Specify how Credit Hours are met by the Course

This class meets for two, 75-minute class periods each week semester and carries the expectation that students will work on course learning activities (read textbook, write program assignments, complete homework quiz problem sets, complete weekly activities, etc.) for an average of 9 hours out of the classroom each week.

Instructor: **Debra Deppeler, Teaching Faculty I, deppeler@wisc.edu**

COURSE WEBSITE, LEARNING MANAGEMENT SYSTEM and INSTRUCTIONAL TOOLS

Canvas Course Website: https://canvas.wisc.edu/courses/382145

Instructor Availability: See Lectures on course website.

Teaching Assistants: See TA Consulting on course website.

> TAs are available to assist students on assignments during TA Consulting hours starting week 2 and ending last day of classes.

Peer Mentors: See PM Activities on course website

Peer Mentors are available to assist students on lecture content and assignment instructions during Peer Mentoring hours starting week 2 and ending last week of classes. Peer Mentors may also plan Bring Your Own Laptop (BYOL) events. The BYOL events will be scheduled and posted on their page.

Canvas, Google docs, Quizlet, Zoom, FlipGrid, Google Docs, Microsoft Teams, MobaXterm, PuTTy may be used in the course as part of assignments. If you create accounts, be sure to use your wisc.edu email address to ensure access to Course assignments and discussions as well as credit for graded tasks.

LEARNING OUTCOMES

(high-level, there are many dozens of learning and coding objectives and skills too)

- Implement and interpret C programs using standard tools and relate C language constructs to both x86 assembly language and fundamental computer system structures.
- Differentiate the memory segments of a process's virtual address space and explain how each is used in C programs.
- Describe and diagram how the heap works internally, analyze the performance of heap allocation strategies, and implement in C a dynamic memory manager.
- Demonstrate how the memory hierarchy functions, differentiate different memory cache implementations, and appraise the effects of memory caching on the performance of C programs.
- Diagram a stack trace of execution for C programs and explain how the compiler implements the stack with x86 assembly language code.
- Formulate C programs that send and receive signals and respond to exceptional circumstances and explain the underlying mechanism that enables asynchronous execution.
- Identify and summarize the steps of C program compilation and describe the processes of linking object code modules to form an executable and loading executables to run them.

GRADING

- *Exams 60%, Projects 30%, Homework Quizzes 8%, Activities 2%*
- *Final Grade thresholds based on Exam performance and grading of all assigned work.*
- *Lecture attendance. Attend all lectures to the best of your ability. Learning via livestream and is not recommended unless you are sick and can't attend in person. If you test positive for Covid, please be sure to wear a mask and socially distance to the best of your ability. There is extra room in each lecture room.*

TEXTBOOKS and OTHER COURSE MATERIALS

- *Computer Systems: A Programmer's Perspective*
- *The C Programming Language*
- *A terminal app that can be used to remote connect to CSL Linux workstations. Students with newer (less than 2 years old) computers can typically use their built-in **Terminal** app Students with a terminal app that does not support Linux commands like: ssh and scp can install **MobaXterm**, **PuTTy**, or another app that permits secure shell remote connections.*
- See campus Computers & equipment for students: What do I need? for instruction.

ASSIGNMENTS

ACTIVITIES and QUIZZES (10%)

2% Activities *include pre-lecture quizzes and simple tasks students are asked to complete to stay current with the course material in between larger programming assignments and quizzes. Each week will have one or two short tasks to complete to earn activity points. Earn at least 10 of these points to earn an Oops point.* **Students are encouraged to help each other complete these weekly tasks.**

- *Activity points may be awarded for completing programming projects before the final accepted due date to incentivize starting early and reward early progress without too much penalty if you cannot submit early for any given assignment.*
- *They will be assigned before they are due, and the due dates are given to keep you working on course throughout the week and not just all at once. You can work ahead of those due dates, but we must have some due dates so that we know when we can score a particular activity.*
- *If you do not want to worry about multiple weekly participation due dates, complete each week's activities during lecture and by Friday of that week.*
- *Note, that you will not need to complete every activity point to earn the max of 80 points for this component. Project and quizzes due dates are managed by Canvas and show clearly in the Assignments page and on the sidebar on the Course home page.*

8% Homework *quizzes must be done individually and* **NOT** *as part of a pair or group. You are not permitted to discuss, even at a high level, or share algorithms, pseudocode, or code. If you have a question, seek answers in the textbook or your notes.* **Students who rely on friends, classmates, tutors, Internet searches, and other groups to complete their quizzes do not do well when asked to solve similar but different problems on the exams.**

Students are encouraged to work with each other, tutors, peer mentors, and TAs to understand textbook and lecture topics, concepts, and examples. Solutions are available once quiz period ends.

- **Flip Grid Videos** - short 1-2 minute videos where you answer a question or demonstrate your understanding of a topic or concept. Peer-Review for kudos and suggestions.
- **Quizlets** – give you a chance to practice understanding terminology that is used in the course.
- **Worksheets and Practice quizzes** – give you a chance to complete problems or activities that you can discuss with classmates and other students. They help you know if you are keeping pace in the course and understanding the smaller parts that are needed to complete larger assignments.
- **Canvas quizzes** - give you the opportunity to answer questions in the way that you will be required to do for the exams. **Complete quizzes as if you're taking an exam and be sure to use Chrome web browser.** Trace the code manually and draw and label diagrams. Think through the questions without relying on your notes, textbooks, computers, or others. You are allowed to use notes and books on quizzes, but not exams. Quiz attempts must be completed before the availability date, or student will not be able to see the questions.
  - *similar breakdown of the project components is 30% for project work. If you complete activities and earn your Oops point, you get that 1% in addition to the 1% activity point. Once your Oops point is earned, you may use should you fail submit a project to Canvas before its availability date as passed. This is a one-time only use and is best if you earn it and never use it.*

PROJECTS (30%)

Provide opportunity to develop programming, testing, and debugging skills and apply concepts for each unit of the course. Concepts required for each project are covered before it is assigned so that you may begin the day it is assigned. **Students who rely on Internet searches, AI tools, friends, classmates, tutors, and other groups to complete their projects do not do well when asked to solve similar but different problems on the exams.**

- Projects are published on Canvas. All C programming must be done using the Linux machines managed by the [CSL CS Department's Systems Lab](https://apps.cs.wisc.edu/accountapp/).. Find your CSLOGIN at: https://apps.cs.wisc.edu/accountapp/
  Login remotely using your Terminal app and the **ssh** command or an **ssh client such as MobaXterm**. Secure copy files from remote to local machine using the **scp** command or **MobaXterm**.
- Project work is submitted by copying files from your Linux account to your local machine, and then uploading to Canvas. The last section of each project specifies what to submit and how to check your submission.
- **Keep a Commit Log and submit a pdf ("snaphot") of it with each project. This log indicates when you finished various milestones of a project.**
- **Students are discouraged from using online searches and AI tools to complete their work.** Such results may be incorrect for any given assignment, but more importantly these results often permit students to skip performing the required skills steps that they will be tested on in Exams. Start projects when released well before assignment is due, and if you cannot solve a problem, let us know. We can direct you to course resources, and add course resources if needed.
- **Students must document all sources of help whether they are people or online resources in your source code. This helps you and us understand what and when you needed outside help understanding. These topics will likely require additional work on student's part to learn.**
- **Students who choose to use Internet searches and AI generators, must document their use.**
  - **Include queries in the file header of your project files.**
  - **Save transcripts of any AI "conversations" as a pdf or txt file, that can be reviewed when asked.**
  - **Failure to document such sources is Academic Misconduct.**
- Projects are graded on the CS Department's Instructional Linux Computers.
  Make sure your work runs as described on CSL computers.

Projects are to be completed individually. You may discuss the project-related concepts as covered in lectures and textbook, but you may not view or discuss **project code**. And you should develop your own pseudocode. Assistance must be documented and submitted with your project.

Questions about your code are best handled during TA Lab Consulting or PM Activities and must not be posted to Piazza or other forums.

Projects are not accepted after Canvas Availability Date.

This is because the due dates are already a week after students are expected to have completed each project. Therefore, working on any assignment past its due date means you are behind the course content and not able to work on the current topics and assignments.

Submit the work you have completed by the due date to get ONTIME points, or by the availability date. There is a one-time use only Oops point for a single exceptional condition, but you will lose 1% (20 points) to use this option. Submit early and backup your progress on each assignment.

EXAMS (60%)

In-person Proctored Exams are the primary tool we use to evaluate your performance in this course.

Your UW PHOTO ID WISCCARD is required to take exams. Exams will be in-person and two hours in duration. Exams are closed book with some reference pages provided as needed. Follow instructions as given for each quiz and exam.

Format: *The exams may be composed of multiple parts. In such cases, Simple choice questions are typically two points each and cover terms and concepts that mainly require memorization. Multiple choice questions are typically three points each and require code tracing, diagramming, and concepts that require multiple steps and more time to answer. Written questions may include fill-in-blank, diagrams, and other computations.*

- **Midterm 1 (15%)**: Week 5, Thursday, February 22nd, 2024, 7:30 PM - 9:30 PM
- **Midterm 2 (20%)**: Week 10, Thursday, April 4th, 2024, 7:30 PM - 9:30 PM
- **Final Exam (25%)**: Final Exam: Friday, May 10th, 2024, 5:05 PM – 7:05 PM

Conflicts must be reported by the end of Week 3, http://tiny.cc/cs354-conflicts
Midterm exams are not cumulative except as required for new content.
Final exam is cumulative with a focus on new material, typically 60-70% new, 40-30% prior material.

PRIVACY OF STUDENT RECORDS and the USAGE of AUDIO RECORDED LECTURES

View more information about FERPA.

TLDR: Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may not record, copy, post any of this material, their notes, or their solutions on public forums or in public repositories.

Lecture materials and recordings for this course are protected intellectual property at UW-Madison. Students in courses may use the materials and recordings for their personal use related to participation in class. Students may also take notes solely for their personal use.

If a lecture is not already recorded, students are not authorized to record lectures without permission unless they are considered by the university to be a qualified student with a disability who has an approved accommodation that includes recording. [Regent Policy Document 4-1]

Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities, with the exception of sharing copies of personal notes as a notetaker through the McBurney Disability Resource Center. Students are otherwise prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

HOW TO SUCCEED IN THIS COURSE

Know that you belong here. *I know that you belong here because you have already shown your ability to do academic work and achieve long-term goals, like getting into the University of Wisconsin. However, I also know that feeling like you belong is different for everyone and that many students take Computer Science courses long before they feel like they belong. If you're feeling out of the loop, let me, TAs, and Peer Mentors help you connect with the material and the course and others who may feel the same. I and most of our course staff have been there, and we can provide personal tips for gaining experience and confidence, and for learning concepts that very new for most students.*

Have a Growth Mindset. *With resources and practice you can become skilled and successful. If it is hard, you can learn something. If you make a mistake, that is expected, and you can recognize it an opportunity to learn something new. Do not be discouraged, the most successful people including your instructor, TAs, and PMs, make many mistakes before achieving success. If you don't understand something, remind yourself that you don't know it YET! We can help suggest ways to experiment and practice, but we can't do it and learn it for you. Only you can do that. When you are out of ideas, check with us.*

Practice. Do your own individual work as well as practice and prepare to present, explain, demonstrate your understanding and skills to anyone: me, a classmate, a Peer Mentor, a TA, in a video, on a quiz, in an exam, to a recruiter, to your family and friends. Too often, we think that understanding what someone says (like your instructor or TA) means that we understand. Unfortunately, that has not been my experience or what many students report.

*Being able to **communicate your knowledge, show your work, and demonstrate your skills on demand** is the bar you must set for yourself to succeed at any new endeavor. It will not be enough to simply be able to follow my or another's example. Instead, take every opportunity to explain your understanding and demonstrate your skills and get feedback. Constructive feedback is best, but all feedback can be useful. Your efforts to "do" things and "show your work" will show you where your understanding is unclear, or where you need more practice. **Practice, Practice, Practice until you can present and solve each step of each problem on demand!***

Course Policies follow University Policies: https://guide.wisc.edu/courses/#syllabustext

STUDENT RIGHTS & RESPONSIBILITIES

ACADEMIC CALENDAR & RELIGIOUS OBSERVANCES

- See: https://secfac.wisc.edu/academic-calendar/#religious-observances
- Report any religious observances that will keep you from submitting work on a M-F of the semester. Use the **exam conflicts** form to report religious observance conflicts.
- **Establishment of the academic calendar for the University of Wisconsin-Madison falls within the authority of the faculty as set forth in Faculty Policies and Procedures.** Construction of the academic calendar is subject to various rules and laws prescribed by the Board of Regents, the Faculty Senate, State of Wisconsin and the federal government. For additional dates and deadlines for students, see the Office of the Registrar's pages. **Students are responsible for notifying instructors within the first two weeks of classes about any need for flexibility due to religious observances.**

Course Evaluations

If you have concerns prior to the end of the semester, please send me email. If you wish to remain anonymous (to me), you may contact any advisor. Some students have used an alias email, though I much prefer a conversation where I can get more information and possibly make changes directly.

Students will be provided with an opportunity to evaluate their enrolled courses and their learning experience. I and most instructors use AEFIS a digital course evaluation survey tool. In most instances, students receive an official email two weeks prior to the end of the semester, notifying them that anonymous course evaluations are available. Student participation is an integral component of course development, and confidential feedback is important. UW-Madison strongly encourages student participation in course evaluations.

TEACHING & LEARNING DATA TRANSPARENCY STATEMENT

The privacy and security of faculty, staff and students' personal information is a top priority for UW-Madison. The university carefully reviews and vets all campus-supported digital tools used to support teaching and learning, to help support success through learning analytics, and to enable proctoring capabilities. View the university's full teaching and learning data transparency statement.

ACADEMIC INTEGRITY STATEMENT

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, **and helping others commit these previously listed acts** are examples of misconduct which may result in disciplinary action. Examples of disciplinary sanctions include, but are not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

- *It is academic misconduct to share your work with others in any form and at any time while taking or after completing CS 354. This especially includes posting your solutions on publicly accessible web sites, such as GitHub, Chegg, Course Hero, PasteBin, and others. Note: Your personal CS 354 coding work is not what employers want to see. Thousands of students have this work and they know you can get much help.*
- *It is academic misconduct for you to copy or use some or all of a program that has been written by someone other than what we've provided in the code skeleton.*
- *Students must document all help, queries, and chat transcripts for all help that you receive via people, online tools like StackOverflow, ChatGPT, and others.*
- *You do not have to document information that you find via our sources: in your notes, the textbook, or the course web site.*

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES STATEMENT

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (UW-855) require the university to provide reasonable accommodations to students with disabilities to access and participate in its academic programs and educational services. Faculty and students share responsibility in the accommodation process. Students are expected to inform faculty of their need for instructional accommodation during the beginning of the semester, or as soon as possible after being approved for accommodation. Faculty will work either directly with the student or in coordination with the McBurney Center to provide reasonable instructional and course-related accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. (See: McBurney Disability Resource Center)

All students have flexibility to complete assignments early and resubmit as often as they like. Students with McBurney flexibility accommodations may earn the ONTIME bonus by submitting their work before the availability date. All student work must be submitted before the availability date to receive credit. Meet with instructor when assignment is released to get additional help getting started.

DIVERSITY & INCLUSION STATEMENT

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals. The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.

MENTAL HEALTH and WELL-BEING

Students often experience stressors that can impact both their academic experience and personal well-being. These may include mental health concerns, substance misuse, sexual or relationship violence, family circumstances, campus climate, financial matters, among others.

Students are encouraged to learn about and utilize UW-Madison's mental health services and/or other resources as needed. Visit uhs.wisc.edu or call University Health Services at (608) 265-5600 to learn more.

Student Support Services

Do report any bias or hate incident you witness or experience.

Seek out help when you need it. The earlier you get advice, support, and other forms of help, the sooner you will get information that can help you. These services can help you or help you find other resources that can help you connect with each other and the campus and computer science communities that welcome and honor your talents.

- University Health Services
- Undergraduate Academic Advising and Career Services
- Office of the Registrar
- Office of Student Financial Aid
- Dean of Student Office
- Food Assistance
- *Some of the many Student Organizations that you may wish to connect with:*
    - *National Society of Black Engineers – Wisconsin*
    - *American Indian Science and Engineering Society (UW-Madison Chapter)*
    - *Gender and Sexuality Campus Center*
    - *WACM (UW-Madison Chapter of ACM's Women in Computing)*

Stress and Anxiety

Stress and anxiety affect us all and worrying tends to increase our stress, creating a vicious cycle that is hard to break. Actions, like making progress towards a goal even a non-academic goal, can relieve some stress, and less stress can leave you more time and energy to put toward achieving other goals.

> *"Worrying about work is not working! "*
> *Debra Deppeler, after too many hours spent worrying about my work and not actually working.*

To me, this means that the time I spend worrying about work is not the same as spending time working. It also means that the more I worry, the more I feel bad which results in less time and energy for my work. Thus, my worrying is not working for me.

Often, I simply need to sleep before I can focus and continue to make progress on a problem. Sometimes exercise (I like to walk, bike, and play softball) or cleaning will help me relieve stress and allow me to return to focus on my work. Sometimes these are simply procrastination activities because I don't yet know how to complete my work.

But, when I accomplish something, I do feel better and often the time spent on those other tasks may even generate a new idea for part of a problem that I am stuck on. This means: Start early, keep learning about yourself, and keep finding what works for you and be open to seeking help from trained professionals if you cannot work things out for yourself.

What is a personal quote or mantra that helps you regain focus for the task at hand and helps you achieve your personal goals? If you think it can help me, please share it with me via email deppeler@wisc.edu