

1 Prerequisites and description, and general information

This course is 4 credits. Its prerequisites are a C– or better in both CMSC 132 and MATH 141.

The goal of the course is to convey the fundamental concepts that enable programs to execute on real hardware. These include how the operating system virtualizes the hardware to provide services and abstractions to allow a user program to effectively use available resources. The course also addresses how different programming constructs work at a low level. The basic abstraction of a program running as one or more threads of control in a single flat address space (a UNIX *process*), and emphasizing it as the model for understanding how a program works, from both the user program and hardware perspective (with the operating system in between), is a theme through the course.

Besides this syllabus, be sure to also read the [handout](#) on ELMS that was provided shortly before the semester began, which discusses some administrative details about the course that are not in this syllabus.

In addition to the policies in this syllabus, many important University policies apply to students. These are summarized at www.ugst.umd.edu/courserelatedpolicies.html. Any student who has not read that information before should take the time to read through it.

The campus Counseling Center has several free drop-in Zoom workshops having to do with various topics regarding academic success (such as study skills, time management, coping with stress, addressing procrastination, etc.) as well as other workshops about common issues of concern to college students. Some of these might be helpful to you. See the list of workshops and topics at <https://www.counseling.umd.edu/workshops>.

2 Course materials and textbooks

Course materials will be provided via [ELMS](#), the University’s learning management system. Registered students (and the top five students on each section’s waitlist during the drop/add period) will automatically get access to ELMS for the course. Essential announcements that students are responsible for reading will be made on the main ELMS page, called the “**News feed**”. Be sure to check every day for new announcements in the **News feed**.

Pointers on C, Reek, Addison–Wesley, 1998; ISBN 0673999866 (required): There will be some readings from this text on material that will not be covered in lecture but will be needed for graded coursework. Although access to this text is required you do not have to buy it— copies are available in McKeldin Library at the Library Services Desk.

Computer Systems: A Programmer’s Perspective, 2nd edition, Bryant and O’Hallaron, Prentice Hall, 2010, ISBN 0136108040: Although this text is neither required nor recommended, some course material (mostly in the second half of the semester) will come from it. For those who need or want more explanation of this material this text can be checked out for two hours at a time from McKeldin Library (under Course Reserves).

3 The instructional staff, contacting us, office hours, course evaluations

3.1 The instructional staff

3.1.1 Instructor

Instructor:	Larry Herman
Office	IRB 1124
Office hours:	Mon 3:30–5:00, Tue 4:00–5:00, Wed 1:30–3:00 (Zoom only), Thu 3:30–4:30

3.1.2 TAs

When the teaching assistants and their duties are finalized, a separate handout will be provided with their information.

3.2 Office hours and email

An office hours handout will be provided separately soon. While assistance for projects is available from the TAs during office hours, you are ultimately responsible for developing and debugging them yourself; learning these skills is part of

the coursework you're being graded for. If you come to office hours for help with program debugging, the TAs will often point you in the right direction, after which it would be up to you to continue working on the problem on your own.

The CMSC department and the University provide free tutoring for many CMSC courses. Information about tutoring will be provided in the **News feed** soon.

Due to the class size the TAs and I will be able to address questions and concerns verbally during office hours, or during, before, or after lecture and discussion section (as time permits), so discuss things with us these ways instead of sending ELMS messages or email. Explaining course material, discussing administrative issues, and assisting with programming projects are things we are only able to do verbally.

Even for the very few issues that must be discussed electronically— typically if we contact you electronically first— we will **only** use the ELMS message system (click on *Inbox* in ELMS), **not** regular University email/Terpmail. Due to the class size we may read messages only every week or so. (An issue that takes an exchange of several messages to answer or resolve would be much faster to discuss verbally.)

3.3 Course evaluations and feedback

Course evaluations are important, and the department and instructors take student feedback seriously. Please complete your evaluation at the end of the semester at www.courseevalum.umd.edu. However, rather than waiting until the end of the course to give feedback, please bring any suggestions or concerns to our attention verbally during the semester. Although we cannot guarantee to be able to change anything that is brought up, we welcome hearing any comments or questions, that you may have, and will see if they can be addressed.

4 Course topics

The following list of topics may vary according to the pace of lecture, so their order and duration are approximate. (B&O refers to the Bryant & O'Hallaron text; anyplace that the name of a book is omitted this means the Reek text.)

	Topic	lectures		Topic	lectures
1.	Course introduction, and moving from Java to C (B&O Ch. 1, Reek Ch. 1–5)	6	9.	I/O and standard libraries (Ch. 15, Sec. 16.1, 16.2, 16.7, 16.8)	3/4
2.	Pointers and functions (Ch. 6–7)	2 1/4	10.	Process control and intro. to systems programming (B&O Sec. 8.1–8.5, 9.1, 9.2, & Ch. 10, Reek Sec. 16.5)	3 1/4
3.	Make and makefiles	1 1/4	11.	Assembly language	2 1/2
4.	Arrays, strings, structures (Ch. 8–10)	2	12.	Concurrency and multithreading with Pthreads (B&O Ch. 12)	2 1/2
5.	Memory allocation (Ch. 11)	1 1/4	13.	Time, program measurement, & optimization (Reek, Sec. 16.3, B&O Ch. 5)	1
6.	Dynamic data structures in C (Ch. 12)	1	14.	Data representation	1/2
7.	Advanced pointer topics, the preprocessor (Ch. 13–14)	3/4			
8.	Implementation of memory management (B&O Sec. 9.9)	1			

5 Coursework, grades, and dates

5.1 Weights of coursework

Coursework will count toward the final grade according to the following percentages:

Midterms	two midterms (weighted 43%; 18% and 25% respectively)
Final (comprehensive)	25%
Programming projects (ten expected projects)	17% (weighted differently; see ELMS)
In-class (discussion or lecture) worksheets	12% (equally weighted)
Class participation	3% (information will be provided in class)

Besides the graded coursework, ungraded practice problems will be provided as in-class worksheets, and as homework and exam practice problems (with solutions) via ELMS. These problems will allow you to test your knowledge of

the material and prepare for graded coursework. If you have questions about these problems or need help solving them, ask during office hours. Some of the in-class worksheets will be graded; these will not be announced in advance, and will be pair exercises.

5.2 Project policies and minimum project requirements

Unlike the preceding courses, the program development environment in CMSC 216 will not be the Eclipse IDE, but rather command-line Linux. Programming will be done on the Division of Information Technology's Grace Cluster. Students will use a TerpConnect account to access the Grace machines and do coursework (your TerpConnect account should be created automatically). Information about connecting to and using the Grace machines will be provided separately shortly.

Projects will be submitted to the same CMSC project submission and testing server as in the preceding courses. However, a different mechanism will be used to turn programs in now. Details will be provided with the first project.

A handout with the project submission and grading policies will be provided when the first project is assigned. Projects will all be worth 100 points, but they will be weighted differently based on difficulty. Some projects will be larger and more difficult, and will have more time to be done in. Others will be smaller and easier, and less time will be given for them. In order to be eligible to pass the course, a student **must** submit versions of all projects that satisfy minimum criteria, as the project policies handout will explain.

5.3 Grading and grades

Grades will be recorded on ELMS. There will be more worksheets in the gradebook than we will actually end up having; unused worksheet entries in the gradebook will just be deleted as they turn out not to be needed.

If you think something may have been graded incorrectly on an exam you may give a written explanation (procedures will be provided after the first exam) **within a week** of when the graded exam is returned and solutions are provided. Questions about a project should be directed to the TA who graded it (**not** me or your teaching TA); their name will appear in the graded project. Questions about graded in-class worksheets should be directed to me in office hours.

Ask questions or discuss concerns about any grades verbally. Do not make comments on coursework or grades in the ELMS gradebook; due to the size of the course and the design of ELMS they will not be read.

Final course grades will be curved as needed, based on each student's total numeric score for all coursework at the end of the semester. (In other words, individual assignments or exams will not be curved; just the final course grades.) It is expected that plus/minus grades will be given, although the distribution of grades and performance of students will dictate what the curve will look like (or even if there is one), how many grades in each range there will be, etc.; these are things that cannot be predicted in advance.

5.4 Exam and project dates

Midterm exams will be given on the dates below in your **own lecture**. If you have a reason to take a midterm on the same day but in my other lecture then discuss it with me during office hours in advance. If you have a conflict with a scheduled exam day due to a reason covered by University policy report it using the **Report an absence** system, discussed below, as early as possible. The dates below could vary depending on class progress or other factors. **Put these dates in your calendar now:**

Project #1:	Mon, Feb. 9
Project #2:	Wed, Feb. 18
Project #3:	Mon, Mar. 2
Exam #1:	Thu, Mar. 5
Project #4:	Tue, Mar. 10

Project #5:	Tue, Mar. 24
Project #6:	Fri, Mar. 27
Project #7:	Wed, Apr. 8
Project #8:	Tue, Apr. 21

Exam #2:	Thu, Apr. 23
Project #9:	Thu, Apr. 30
Project #10:	Thu, May 7
Final exam:	Tue, May 12, 6:30–8:30 p.m.

Besides cases of excused absence due to University-approved causes, the final exam will be rescheduled **only** for students having another final at exactly the same time (this should only apply to BMGT 221 or ENES 221), or for students with **more than** three final exams on the same day. If either situation applies to you, use the **Report an absence** system discussed below to inform me **at least two weeks in advance** of the final exam.

6 Class, absences and excused absences, and accommodations

Class locations and times are available in the [Schedule of Classes](#). Students are responsible for all course and administrative material discussed in lecture and discussion, whether they were in class to hear it or not. Other than cases of excused absences as discussed below or University cancellations, students should attend all lectures and discussions.

Electronic devices (laptops, tablets, cell phones, etc.) may not be used in lecture.

On a regular basis students are **only** allowed to attend the lecture and discussion section they are registered for. (This is partly to avoid overcrowding in some sections.) In-class graded coursework may not receive credit if it is done in a different lecture or discussion section than the one you are registered for. If you have a convincing reason to request permission to regularly attend a different lecture or discussion section than the one you are registered for you may discuss the situation with me (verbally during office hours), however, such situations usually can't be accommodated.

If you **occasionally** cannot attend your own lecture or discussion you can attend a different one, but this does not mean you can attend a different one on a regular basis or that you will necessarily receive credit for in-class coursework done during a different class (see more below).

6.1 What to do if you will be missing class (lecture or discussion)

Please do not send me (or your TA) a message/email about any absences. The size of the course makes it impossible to keep track of most absences this way. Report any absences as explained below.

The term “excused absence” used below refers to missing class– lecture or discussion section– for a University–approved reason, which will not affect a student’s grade.

University policy requires that students inform instructors about absences **in advance** for them to be excused (see below for how to report an absence), or **as soon as possible** if the nature of the absence makes advance notification **impossible**. Where reporting an absence in advance is mentioned below it refers to reporting the absence (using the mechanism described below) **prior to the beginning of the first class session that you will be missing, or as early as possible** if advance notification is not possible, due to the nature of the absence.

Instead of using ELMS messages/email to report an absence, use the [Report an absence](#) system reachable from ELMS, and read the information there carefully (as well as [Section 6.2](#) below). As above you must report an absence **in advance** (which is defined above) for it to be excused.

If, as mentioned above, a **few times** during the semester you aren't able to attend your own lecture or discussion but can go to a different one you should do that, to avoid missing essential material. (Please do **not** send ELMS messages/email asking permission to do this; just show up, after reporting the situation using the [Report an absence](#) system.) However, see below about whether you can get credit for graded coursework done in a different class.

Before or after any absence please **do not** send a message to me or your TA to find out what the missed class covers, as the course size and number of students who miss class makes it infeasible for us to fill them in individually. Instead you would be responsible for finding out what was missed by getting notes from a classmate who was present.

6.2 Excused absences

The University’s course–related policies for excused absences and other situations are summarized at the link above, which is www.ugst.umd.edu/courserelatedpolicies.html. **Most policies there are not repeated here, so read that information carefully.** Here I only emphasize a few points from that page and define necessary specifics for this course.

- **Advance notification** (as defined above) is required for an absence to be excused.
- Of course an absence has to be for a University-approved reason to be excused. The course–related policies linked to above describe the University–approved reasons for excused absences.
- For this course, any documentation provided to support an excused absence (as described in the policy) **must be submitted via the [Report an absence](#) system**. (Please do **not** send documentation via messages/email.) Medical documentation must specify dates of illness or inability to attend class.

The University’s template for self–signed notes (for absences that they can be used for) is [here](#).

- Self–documentation of illness (a self–signed note) can be used **for one absence during the semester where you miss graded coursework that is not a major scheduled grading event** (this term is defined in the course–related policies linked to above). You may use a self–signed note as many times as needed for absences where you did not miss any graded coursework (as long as the information you are attesting to is accurate, of course).

- The major scheduled grading events will be the midterm exams and the final exam. A self–signed note can **not** be used for absences affecting these; you must have documentation other than a self–signed note for such absences.

6.3 How excused absences will be handled

If you think it is necessary to discuss missed coursework due to an absence verbally (beyond just reporting the absence via the [Report an absence](#) system), or if you get a reply to an absence report in the **Report an absence** system that says that you need to discuss the absence verbally, then it must be discussed with me, verbally in my office hours, even if the coursework that was missed was done in discussion section. (In other words, the TAs cannot make arrangements or allowances for absences.)

- An excused absence for an exam will be handled by giving a makeup exam. The makeup exam must be taken as soon as is possible, of course taking the cause of the absence into account.
- There will not be makeup worksheets; instead, the score for an excused absence for a graded worksheet will be the average of your scores for the other graded worksheets (just like dropping that worksheet).
 - **Once in the semester** you can do a graded worksheet in a different lecture or discussion section (on the same day) without needing a reason, if you are unable to attend your own class that day **and** you report the absence in advance (as defined above) using the [Report an absence](#) system mentioned above.
 - If you have done already a graded worksheet in a different class without a reason, to get credit for other missed ones the reason must be University–approved (e.g., illness, accident, emergency, etc.), it must have been reported **in advance** (as defined above), and in most cases there should be documentation of the situation.
- Note that excused absences are **almost never justification for extensions on projects**. Projects will be assigned with sufficient time to be completed by students who have a reasonable understanding of the necessary material and begin promptly, even if an absence occurs. In cases of **protracted, extremely serious major** illness, or **severe emergency situations, which affect the majority of time that a project was assigned, a short** extension on the project may be considered, depending upon the circumstances. Report the situation as soon as possible using the [Report an absence](#) system (you will likely be asked to discuss the situation with me verbally afterwards as well).

6.4 Students with disabilities

A student with academic accommodations due to disability must provide documentation from ADS (Accessibility and Disability Support Services) to their instructor **near the beginning of the semester** (or as soon as they receive accommodations if it occurs during the semester). According to ADS we are expected to discuss accommodations privately and in detail, so it must be done verbally in my office hours, not after class and not via ELMS messages/email. Accommodations cannot be given retroactively, so you must provide documentation and discuss your accommodations **more than a week prior to** any coursework where an accommodation may apply to be eligible to receive it.

7 Academic integrity

Campus policy asks students to include the honor pledge on each examination or major assignment in every course; consequently, you will be requested to write it on exams and type it in projects.

Unless otherwise noted, all graded coursework is to be done **individually**, so cooperation or use of unauthorized materials on assignments is a violation of the University’s Code of Academic Integrity. **Any evidence** of this **will be submitted** to the Office of Student Conduct, which could result in an XF for the course, suspension, or expulsion.

For academic honesty purposes, **programming projects are to be considered comparable to a take–home exam, so any cooperation that would be prohibited on an exam is also prohibited on a project**. Note the following:

- Students are welcome to study together or to receive help from anyone else in learning the course material. It’s OK to discuss with others the course material or the **requirements** of a project.
- But when it comes to actually designing, writing, or debugging a project, other than help from the instructional staff, these must **solely and entirely** be a student’s **own original, individual work**.

VIOLATIONS OF THE CODE OF ACADEMIC INTEGRITY MAY INCLUDE, BUT ARE NOT LIMITED TO:

1. Failing to do any of the work on a project by yourself, other than assistance from the instructional staff.

2. Using any ideas or any part of another person's project, or copying anyone else's work in any way.
3. Giving any parts or ideas from your project, including test data or test cases, to anyone else.
4. Transferring any part of a project to or from anyone else, by any means.
5. Putting a project anywhere (for example, a website online) for any other students to access. (Note this also applies to providing project code to future students taking the course in later semesters.)
6. Using any form of AI to produce any part of coursework that will be graded.

You are allowed to use AI to look up information about the course material, for example information about Java or data structures, but not to create any graded coursework. However, since AI is often wrong, or may have correct but inapplicable information, and it is not possible to tell from AI answers whether they are right or wrong unless you already know the information, you are strongly encouraged to ask any questions about the course material in office hours **instead** of trying to use AI for answers.

In designing or writing projects, students are free to use information in the textbook and code provided by the instructional staff, **only** if the source is cited in a comment in the relevant section of the project code, only short sections of provided code are used, and the substantial part of the coursework is the student's own original, individual work. If you have any question about a particular situation or source, ask me in advance.

Should you have difficulty with a project you should see the teaching assistants in office hours, rather than soliciting help from anyone else in violation of these rules.

IT IS THE RESPONSIBILITY, UNDER THE HONOR POLICY, OF ANYONE WHO SUSPECTS ACADEMIC DISHONESTY HAS OCCURRED TO REPORT IT TO THE INSTRUCTOR, OR DIRECTLY TO THE OFFICE OF STUDENT CONDUCT.

You are encouraged to learn more about academic integrity at the Student Honor Council's website, and to read the Code of Academic Integrity, the Code of Student Conduct, and the University's policy regarding acceptable use of information technology resources (including computer accounts) for yourself, using the links on the course's ELMS page.

8 Copyright for materials

Most course materials are copyright Larry Herman (and in some cases other CMSC faculty and instructors not specifically listed due to space limitations) © 2026. All rights reserved for these materials. Students are permitted to use course materials for their own personal use only. Materials may not be distributed publicly or privately to any others (excepting other students currently in the course), in any way or format.

Note that as the course-related policies at <https://www.ugst.umd.edu/courserelatedpolicies.html> say, "Class lectures and other course materials are copyrighted and may not be reproduced for anything other than your personal use without the permission of the course instructor. Course materials are the property of the course instructor - do not sell them, do not post them on a website. Be aware that copyright infringements may be referred to the Office of Student Conduct." (This is under "Copyright and Intellectual Property" on that page.)

9 Mandatory notice of mandatory reporting

As a faculty member I am designated as a "Responsible University Employee," meaning that I must report any disclosures of sexual assault, sexual harassment, interpersonal violence, or stalking to UMD's Title IX Coordinator, per the University Policy on Sexual Harassment and Other Sexual Misconduct.

If you wish to speak with someone about issues like these confidentially, please contact one of UMD's confidential resources, such as [CARE to Stop Violence](#) (on the ground floor of the Health Center) at (301) 741-3442, or the [Counseling Center](#) (in the Shoemaker Building) at (301) 314-7651. (You would have to find someone else to talk with confidentially because, as the previous paragraph says, I am not allowed to speak confidentially about such matters.)

You may also seek assistance or supportive measures from UMD's Title IX Coordinator by calling (301) 405-1142, or emailing titleIXcoordinator@umd.edu.

For further information on the above see the Office of Civil Rights and Sexual Misconduct's website at ocrsm.umd.edu.

10 Changes made since the syllabus was originally provided

University policy is that students must be informed of any changes made to the course syllabus after a semester begins. If any changes are made to this syllabus after classes begin they will be added to this section.