

## 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 the day before classes began, which discusses some administrative details about the course that are not in this syllabus.

The campus Counseling Center has several drop-in Zoom workshops having to do with various topics regarding academic success, 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>.

In addition to the policies in this syllabus, various University policies apply to students. These are summarized in or linked to from [www.ugst.umd.edu/courserelatedpolicies.html](http://www.ugst.umd.edu/courserelatedpolicies.html).

## 2 Course materials and textbooks

Course materials will be provided via [ELMS](#), the University’s learning management system. Registered students (and the top five 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 and will be in graded coursework.

**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 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; where the name of a book is omitted this means the Reek text.)

	Topic	lectures
1.	Course introduction, and moving from Java to C (B&O Ch. 1, Reek Ch. 1–5)	5 3/4
2.	Pointers, strings, and structures in C (Ch. 6–10)	4 1/4
3.	Memory management (Ch. 11)	1
4.	Make and makefiles	1
5.	Dynamic data structures in C (Ch. 12)	3/4
6.	Advanced pointer topics, the preprocessor (Ch. 13–14)	1 3/4
7.	Testing	1/2
8.	I/O and standard libraries (Ch. 15, Sec. 16.1, 16.2, 16.7, 16.8)	3/4

	Topic	lectures
9.	Implementation of memory management (B&O Sec. 9.9)	1 1/4
.75 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)	.75 3
11.	Assembly language	2 1/2
12.	Concurrency and multithreading with Pthreads (B&O Ch. 12)	2
13.	Time, program measurement, and optimization (Reek, Sec. 16.3, B&O Ch. 5)	.75 1 1/2
.75 14.	Libraries and linking, and data representation (B&O Sec. 7.6.2, 7.10, 7.11, and Ch. 2)	.75 1

## 4 The instructional staff, office hours, email, and course evaluations

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

### 4.1 Instructor

Instructor:	Larry Herman
Office	IRB 1124
Office hours:	Mon 2:30–4:30 (Zoom), Wed 1:00–3:00, Thu 10:00–12:00

### 4.2 Office hours and email

The TAs' office hours 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 projects 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 later.

Due to the class size the TAs and I will not use email (ELMS messages) except in a few specific exceptional situations. Instead, we can address questions and concerns verbally during office hours, or during, before, or after lecture and discussion section, as time permits. Explaining course material, discussing administrative issues, and assisting with programming projects are things we are only able to do verbally.

Even in case of the few urgent emergency issues that **must** be discussed electronically, we will **only** use the ELMS message system (click on *Inbox* in ELMS), not regular University email. Due to the class size messages may only be read every week or so. (If you have a question or issue that takes an exchange of several messages to answer or resolve it would be much faster to just discuss it verbally.) Even in urgent situations requiring electronic contact, do **not** send a message to all members of the instructional staff. (There is no problem that requires dozens of people to address it.)

### 4.3 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](http://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.

## 5 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, which is an especially important consideration at this time.) In-class graded coursework may not receive credit if it is done in a different lecture or discussion section without permission. 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) and I will consider it.

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).

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

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 class you will be missing, or as early as possible** if advance notification is not possible.

*If you are missing an exam and you have not already talked with me about it earlier:* Send me an ELMS message **immediately**. Then **also** fill out the [Report an absence](#) form on ELMS, to indicate dates of absence and be able to upload documentation.

*For any absence other than missing an exam at the last minute:* **Do not send me (or your TA) a message about the absence. The size of the course makes it impossible to keep track of most absences this way.**

**Instead of** using email/ELMS messages to report an absence, fill out the [Report an absence](#) form on ELMS, and read the information on it carefully (as well as Section 5.2 below). As above you must fill it out **in advance** (which is defined above) for the absence to be excused.

If a **few times** during the semester you are not able to attend your own lecture or discussion but can go to a different one you should do that, so as not to miss essential course material. (Please do **not** send email/ELMS messages asking permission to attend another class; just show up, and of course fill out the [Report an absence](#) form mentioned above.) However, see below about whether you can get credit for in–class 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 you will miss or missed, because the size of the course and the number of students who miss class makes it infeasible for us to fill them in individually via email. Instead you would be responsible for finding out what was missed by getting notes from a classmate who was present.

**If it turns out that you did not miss any in–class graded coursework during an absence:** Then you **do not have to discuss the absence with me individually**– filling out the [Report an absence](#) form mentioned above (and uploading documentation) is sufficient.

**If you did miss any in–class graded coursework during an absence:** You will need to discuss the situation verbally with me in office hours later, to determine if it qualifies as an excused absence, and so coursework that was affected by the absence can be properly handled. Be sure to read Section 5.2 below first.

Filling out the [Report an absence](#) form **does not** by itself make an absence excused. It just avoids having to discuss every absence via email (ELMS messages) in a course with hundreds of students.

## 5.2 Excused absences

The University’s course–related policies for excused absences and other situations are summarized at

[www.ugst.umd.edu/courserelatedpolicies.html](http://www.ugst.umd.edu/courserelatedpolicies.html)

**Most policies there are not repeated here– you should 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.
- For this course, any documentation provided to support an excused absence (as described in the policy) **must be in PDF format** and submitted via the [Report an absence](#) form. (Please not upload images or other formats, and do **not** send documentation via messages/email.) If you write a [self–signed note](#) you can either scan it if you have a scanner, or install a camera scanner app from your phone’s app store (just search for “camera scanner”) to take a picture of it that will be converted to PDF. (Adobe has an **Adobe Scan** app, and there are others as well.) Medical documentation must specify dates of illness or inability to attend class.
- Self–documentation of illness can be used **once during the semester** for an excused absence where you missed graded coursework, and **not** for the major scheduled grading events (this term is defined in the policy linked to above)
- The major scheduled grading events, which self–documentation of illness can **not** be used for, are the midterm exams and the final exam.

### 5.3 How excused absences will be handled

Missed coursework due to excused absences must be discussed with me, verbally in office hours, even if the coursework that was missed was done in discussion section.

- 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 are no makeup worksheets. Rather than a makeup or extra time to complete it, the score for an excused absence for a practice worksheet will be the average of your scores for the other in-class worksheets (just like dropping that worksheet). (The score, meaning average of your scores for the other worksheets, will be entered in the gradebook sometime before the end of the semester; there are reasons why it sometimes cannot be done right away.)
  - **Once in the semester** you can do a practice worksheet in a different lecture or discussion section without a reason, if you are unable to attend your own class and you report the absence in advance (as defined above) using the [Report an absence](#) form mentioned above.
  - If you have already done one practice worksheet in a different class without a reason, you will only get credit for other ones done in the wrong class in case of a University-approved reason (such as illness, accident, emergency, etc.), and you have reported the absence **in advance** (as defined above).

**In either case you must still discuss the absence with me verbally in office hours later** so the worksheet can be properly handled.

- 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 excused absence occurs. In cases of **protracted, extremely serious** 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. Discuss such a situation with me as soon as possible (verbally unless it's impossible to do so).

### 5.4 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 email/ELMS messages. 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.

## 6 Coursework, grades, and dates

### 6.1 Coursework

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

Midterms (two midterms)	36% (11% and 23%)	
Final (comprehensive)	28%	
Programming projects (eleven expected projects)	27%	(weighted differently; see ELMS)
In-class (discussion or lecture) worksheets	11%	(equally weighted)

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 the TAs' office hours (or discussion section, if time permits). Some of the in-class worksheets will be graded; these will be unannounced. Graded in-class worksheets can be done individually or together with classmates.

## 6.2 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 Linux command-line. Programming will be done on the Division of Information Technology's Grace Cluster, which can be accessed at [grace.umd.edu](http://grace.umd.edu). Students will use a TerpConnect account to access the Grace cluster and do coursework (your TerpConnect account should be created automatically).

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 Project #1 is assigned. Projects will all be worth 100 points, but they will be weighted differently based on difficulty. Some projects will be much larger and more difficult, and will have more time to be done in. Others will be smaller and easier and just a short time will be given for them. Because their relative difficulty can't necessarily be known in advance, the project weights in the ELMS gradebook may be adjusted slightly near the end of the semester. In order to pass the course, a student **must** submit versions of all projects that satisfy minimum criteria, as the project policies handout will explain.

## 6.3 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 later.

If you think that something may have been graded incorrectly on an exam you may give a written explanation (specific procedures will be provided after the first exam) within a week of when the graded exam is returned and solutions are provided. Questions about project grading should be directed to the TA who graded the project (**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 if there even is one), how many grades in each range there will be, etc.; these are things that cannot be predicted in advance.

## 6.4 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 the other lecture time then discuss with me during office hours in advance. If you have a conflict with a scheduled exam day, which is due to a reason covered by University policy and is known in advance, talk with me during office hours as soon as possible. The dates below could vary depending on lecture progress or other factors. **Put these dates in your calendar now:**

Project #1:	Tue, Feb 7
Project #2:	Wed, Feb 15
Project #3:	Mon, Feb 27
Project #4:	Thu, Mar 2
Project #5:	Tue, Mar 7

<b>Exam #1:</b>	<b>Thu, Mar 9</b>
Project #6:	Tue, Mar 14
Project #7:	Thu, Mar 30
Project #8:	Wed, Apr 12
<b>Exam #2:</b>	<b>Thu, Apr 20</b>

Project #9:	Tue, Apr 25
Project #10:	Thu, May 4
Project #11:	Wed, May 10
<b>Final exam:</b>	<b>Sat, May 13, 4-6</b>

The final exam will be rescheduled **only** for students having another final at exactly the same time (which should only apply to BIOM 301, EDMS 451, and ENMA 300/ENME 382), or for students with more than three final exams on the same day. If either situation applies to you, you must inform me **at least two weeks in advance** of the final exam.

## 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 or type it on exams and 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, **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:

- In learning the material students are welcome to study together or to receive help from anyone else. It's OK to discuss with others the course material or the **requirements** of a project.
- 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 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 program, or copying anyone else's work in any way.
3. Giving any parts or ideas from your program, including test data or test cases, to anyone else.
4. Transferring any part of a program to or from anyone else, by any means.
5. Putting a program anywhere (for example, a website online) for any other students to access. (Note this also applies in the future to students taking the course in later semesters.)

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 program, only short sections of provided code are used, and the substantial part of the coursework is the student's own 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) © 2023. 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. By University policy, a student who distributes copyrighted material without permission (that would include uploading materials that are copyrighted by an instructor to websites) is subject to being forwarded to the Office of Student Conduct.