CMSC 216   Introduction to Computer Systems   Fall 2018

In addition to the policies in this syllabus, various University policies concerning attendance, absences, academic integrity, etc., apply to students. These are summarized in or linked to from `www.ugst.umd.edu/courserelatedpolicies.html`.

1   Prerequisites and description

This course is 4 credits. Its prerequisites are a C− or better in both CMSC 132 and MATH 141, and its corequisite (or prerequisite) is CMSC 250 (or equivalent).

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.

2   Course materials and textbooks

Course materials will be provided via the University's ELMS site `www.elms.umd.edu`. Registered students (as well as the top five on the waitlist in each section during the registration period) will automatically get access to ELMS for this course. Essential announcements will be made via ELMS that students are responsible for reading. The textbooks are:

***Pointers on C*, Reek, Addison–Wesley, 1998; ISBN 0–673–99986–6 (required):** You will be assigned some readings from this text on material that will not be covered in lecture and will be in graded coursework. A copy is available in McKeldin Library from the Library Services Desk, which can be checked out for 4 hours at a time.

***Computer Systems: A Programmer's Perspective, 2nd edition*, Bryant and O'Hallaron, Prentice Hall, 2010, ISBN 10: 0–13–610804–0:** Although this text is neither required nor recommended, some course material (mostly in the second half of the semester) will come from it. It can be checked out two hours at a time from McKeldin Library (under Course Reserves), for those who need or want more explanation of this material.

Do not use illegal copies of the textbooks.

3   The instructional staff, office hours, email, and course evaluations

Instructors

	Larry Herman
sections:	010X and 030X
office:	3211 A.V. Williams
phone:	(301) 405–2762

	Dr. Pedram Sadeghian
sections:	040X
office:	3267 A.V. Williams
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Teaching TAs (section(s))

Joan Zhang	0101
Erik Ochoa	0102
Matt Goldberg	0103
Amulya Sai Bellam	0104 & 0303
Yufei Huang	0105
Michael Curry	0106 & 0301
Amy Zhao	0107
Asher Fink	0108
Saumya Rawat	0302 & 0305
Brandon Stoeckel	0304
Samyadeep Basu	0306 & 0308
Michael Anderjaska	0307
Saewon Kwak	0401
Adam Hamlin	0402
Gavriel Epstein	0404

Grading TAs

Akhil Saini
Bhavik Bhatt
Bob He
Dale Dullnig
Hamed Mohammadabad
Michael Bui
Michael Maynord
Nathan Li
Nirat Saini
Rana Khalil
Rhea Lieberman
Shruti Sharma
Tao Hu
Yifan Yu

3.1   Office hours and email

Office hours will be provided in a separate handout 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, expect the TAs to point you in the right direction, after which it would be up to you to continue working on the problem on your own.

Because of the class size (nearly 600 students), electronic communication is to be used for urgent or emergency matters only. The instructional staff is not able via email to explain course material, assist with programming projects,

discuss administrative issues, etc. Instead, discuss these in person (office hours, or before and after discussion section or lecture, if time permits).

Even in case of urgent issues that must be discussed electronically, you **must** use the ELMS message system to contact the instructional staff (click on *Inbox* in ELMS). 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, this would take much longer than just discussing it in person.

3.2 Course evaluations and feedback

Course evaluations are important, and the department and instructors take student feedback seriously. Please complete your evaluation later in 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 in person 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; where the name of a book is omitted this means the Reek text.)

Topic	# lectures
Course introduction (B&O Ch. 1)	1/2
Moving from Java to C (Ch. 1–5)	5
Pointers, strings, and structures in C (Ch. 6–10)	4
Memory management (Ch. 11)	1/2
Dynamic data structures in C (Ch. 12)	1
Make and makefiles	1
Testing	1/2
Advanced pointer topics, the preprocessor (Ch. 13–14)	1 1/2
Implementation of memory management (B&O Sec. 9.9)	1
I/O and standard libraries (Ch. 15, Sec. 16.1, 16.2, 16.7, 16.8)	1/2

Topic	# lectures
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
Assembly language	3
Concurrency and multithreading with Pthreads (B&O Ch. 12)	2
Time, program measurement, and optimization (Reek, Sec. 16.3, B&O Ch. 5)	1 1/2
Libraries and linking (B&O Sec. 7.6.2, 7.10, 7.11)	1/2
Data representation (B&O Ch. 2)	1/2

5 Class, attendance, absences and excused absences, and accommodations

Class locations and times are available in the Schedule of Classes at https://ntst.umd.edu/soc. Students are responsible for all academic and administrative material discussed in lecture and discussion section, whether they were in class to hear it or not. Other than cases of excused absences (see Section 5.3 below) or University cancellations, students are expected to attend all lectures and discussion sections.

Electronic devices (laptops, tablets, cell phones, etc.) may not be used in Larry Herman's lectures. Attendance will be taken during Larry Herman's lectures using a system called Arkaive, via an app that you install on your phone. Students in Larry Herman's sections should install the Arkaive app now, from either the App Store or Google Play, to be able to report attendance. Further details will be given in class.

On a regular basis students must attend the lecture and discussion section they are registered for, unless they have a reason to regularly attend a different one and ask their instructor (in person) for permission. In–class graded coursework will not be counted if it is done in a different lecture or discussion section without permission.

5.1 Absences

Unless you are missing (or already missed) an exam due to last minute illness or emergency, do **not** email your instructor (or TA) about an absence. If you are unexpectedly missing an exam, send a message via ELMS to your instructor immediately. (The rest of this section applies to all **other** absences.)

If you are going to miss class (lecture or discussion) and you <u>can</u> attend another class:

If a **few times** during the semester you know in advance that you are not going to be able to attend your own lecture or discussion but are able to go to another one at a different time, you are expected to do that; there may

be in–class graded coursework that you would otherwise miss and not get credit for. (You must inform either the instructor or TA– in person right before the other class– to get permission to do any graded coursework there, otherwise it will not be counted. Do not send email to get permission to attend another class; ask in person before class.) If you do attend another class it is not an absence.

If you are going to miss class (lecture or discussion) and you <u>cannot</u> attend another class:

If you know you are going to miss class and cannot attend another one, and you think it may be a case where the absence could be excused (excused absences are defined and described in Section 5.3 below), do not send email– the size of the course makes it impossible to keep track of absences via email. Instead fill out the Report an absence form on ELMS, and read the information on it carefully (as well as Section 5.3 below). Except in cases where advance notification is impossible, you are expected to fill out this form **in advance** (which means **prior to the beginning of the class you will be missing**), or the absence will likely not be excused.

You will need to discuss the absence in person with your instructor when you return, to present required documentation, determine if the absence is excused, and make arrangements (if necessary) for coursework affected by the absence. Be sure to read see Section 5.3 below before discussing the absence.

Before or after any absence, excused or not, do not email your TA or instructor to find out what you will miss or missed. The size of the course makes it infeasible for us to fill you in via email. Instead you would be responsible for finding out what was missed and getting notes from a classmate who was present. (If you don't know anyone else in the course just ask whoever is sitting next to you when you can return to class about what happened during your absence.)

5.2   Excused absences

An excused absence refers to missing class for a University–approved reason, which will not affect a student's grade. The University's course–related policies for excused absences and other situations are summarized at:

<div align="center">www.ugst.umd.edu/courserelatedpolicies.html</div>

Most policies there are not repeated here– you should read that information carefully. Here we only emphasize a few points from that page and define necessary specifics for this course.

- For it to be excused, notification of absence must be provided **in advance**, or **as soon as possible** for situations where advance notification cannot be given.

- For this course, any documentation provided to support an excused absence (as described in the policy) must be in **hardcopy** (not scanned or emailed).

  Medical documentation must specify dates of illness or inability to attend class. Please add to any documentation the list of specific graded coursework (if any) that you missed during the absence, if you think it may be excused.

- As mentioned above, use Report an absence on ELMS to inform us of a absence. (Note you must still discuss the absence with your instructor in person as soon as possible when you return, to provide documentation, etc.)

- Self–documentation of illness can be used only **once during the semester** for an excused absence.

- The major scheduled grading events (this term is defined in the policy linked to above), 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

All arrangements for excused absences and missed coursework must be made with your instructor, 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.

- Rather than a makeup or extra time to complete it, the score for an excused absence for an in–class worksheet will be the average of the student's scores for the other in–class worksheets.

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 <u>**severe emergency situations,**</u> <u>***short***</u> extensions on projects may be considered, depending upon the circumstances. Discuss the situation with your instructor as soon as possible (in person unless this cannot be done).

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**. (Bring it to office hours; do not discuss after class.) Arrangements for exam accommodations **must** be made with your instructor **at least <u>three business days</u> prior to the exam date**, or (according to ADS) the right to an accommodation will be forfeited.

6 Coursework, grades, and dates

If you experience difficulty during the semester keeping up with the academic demands of your courses, you may consider contacting the Learning Assistance Service. Their educational counselors can help with time management issues, reading, note–taking, and exam preparation skills.

6.1 Coursework

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

Midterms:	three midterms	39%	(equally weighted)
Final:	will be comprehensive	26%	
Programming projects	thirteen expected projects	25%	(weighted differently)
In–class (discussion or lecture) worksheets	these will typically be group work	10%	(equally weighted)

Besides the graded coursework, ungraded practice problems will be provided as worksheets done during class, 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 but not all of the in–class worksheets will be graded; these will be unannounced and will usually be pair or group exercises.

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 command–line use of Linux. Programming will be done on the Division of Information Technology's Grace Cluster, which can be accessed at `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 much smaller and easier, and will be assigned for just a few days. Because their relative difficulty can't necessarily be known in advance, their weights will be approximated in the gradebook, and finalized near the end of the semester. In order to be able to pass the course a student **must** submit versions of all projects that satisfy minimum criteria, as the project policies will explain in detail.

6.3 Grading and grades

Grades will be recorded on ELMS. There may be more assignments in the gradebook than we will actually end up having; any unused assignments in the gradebook will just be deleted at the end of the semester.

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

If you feel that something was graded incorrectly on an exam you may give a hardcopy explanation to your instructor within a week of when the exam is returned and solutions are provided. The exam may be regraded in its entirety, and it may be determined that it deserves fewer points than given in the original grading. (Therefore it is in your interest to check carefully and make sure that something was really graded wrong before asking for the grading to be reconsidered.) Questions about project grading should be directed to the TA who graded the project.

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 things that cannot be predicted in advance. Course grades may be given separately by the two instructors.

6.4 Exam and project dates

Midterm exams will be held during lecture. The exam and project due dates are below. These dates might vary depending on lecture progress and other factors (for example, if the University has unexpected closures, the entire remaining schedule could require readjustment). Inform your instructor immediately if you have a conflict with a scheduled midterm date.

Project #1:	Wed, Sep 12		Project #6:	Mon, Oct 15		**Exam #3:**	**Tue, Nov 20**
Project #2:	Tue, Sep 18		Project #7:	Thu, Oct 18		Project #11:	Mon, Nov 26
Exam #1:	**Thu, Sep 27**		**Exam #2:**	**Thu, Oct 25**		Project #12:	Wed, Dec 5
Project #3:	Tue, Oct 2		Project #8:	Tue, Oct 30		Project #13:	Sun, Dec 9
Project #4:	Thu, Oct 4		Project #9:	Thu, Nov 8		**Final exam:**	**Wed, Dec 12, 4–6**
Project #5:	Mon, Oct 8		Project #10:	Tue, Nov 13			

Note: the third midterm will be the *Tuesday before Thanksgiving break*. Keep this in mind in making any vacation travel plans.

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 your instructor **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 <u>also</u> 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 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 your instructor 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 Pedram Sadeghian (and in some cases other CMSC faculty and instructors not specifically listed due to space limitations) © 2018. 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. A student who distributes copyrighted material without permission (for example, uploading materials that are copyrighted by the instructors to websites) are subject to being forwarded to the Office of Student Conduct.