

SYLLABUS

CS 720:
LOGICAL FOUNDATIONS
IN COMPUTER SCIENCE

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Spring 2022

Location: (W01-0062) Room 62, 1st floor, Wheatley
Schedule: 5:30pm to 6:45pm on Monday, Wednesday

NO COURSES REQUIRED BY THE CS MAJOR, MINOR, OR CERTIFICATE MAY BE TAKEN PASS/FAIL.

Course description. The course treats the logical foundations of computer science in a mathematically rigorous way but with emphasis on the applications of logic in computer science. Topics include the syntax and semantics of predicate logic, formal systems for predicate logic, many-sorted logic, and logic programming. Additional topics may include equational logic, algebraic specification, term rewriting, program verification, nonstandard logic, and databases. Students are expected to demonstrate an understanding of theoretical material and the ability to apply it.

Prerequisites. Math470 or equivalent and permission of the instructor.

Textbook. Software Foundations (Volume 1 and 2). Benjamin C. Pierce, *etal*¹.

Topics covered. Semantics of programming languages; Functional programming; Program equivalence; Operational semantics; Hoare Logic; Type systems.

¹<https://softwarefoundations.cis.upenn.edu/>

Course work and grades

Final grade consists of:

- Homework: 85%
- Presentations: 15%

Notes:

- Your final grade will be a (possibly weighted) average of at most 12 homework assignments.
- If P is the final percentage of your homework and participation, then your course grade will be calculated as follows, where decimal points are discarded. For instance, a final grade of 69.99 yields a **C+**, **not** a **B-**.
- To obtain a final grade of **D-**, or higher, you need to have 30 points in all homework assignments but one. Otherwise, your final grade is capped at **F**.
- To obtain a final grade of **C-**, or higher, you need to have 50 points in all homework assignments but one. Otherwise, your final grade is capped at **D+**.
- **There will be no exams.**

$95 \leq P$	A
$90 \leq P < 95$	A-
$85 \leq P < 90$	B+
$75 \leq P < 85$	B
$70 \leq P < 75$	B-
$65 \leq P < 70$	C+
$55 \leq P < 65$	C
$50 \leq P < 55$	C-
$45 \leq P < 50$	D+
$40 \leq P < 45$	D
$35 \leq P < 40$	D-
$P < 35$	F

Incomplete grade policy

We consider a **portion the required class work** to be *at most* 20% of the total work, as per the incomplete policy.² For instance, assuming this course has 8 homework assignments and all assignments have the same weight, then a portion of the required class work would be at most 1 home work assignment.

Here is an excerpt from the school's incomplete policy:

²https://www.umb.edu/registrar/academic_policies/incomplete_policy

The grade incomplete (INC) is reported only where a portion of the assigned or required class work, or the final examination, has not been completed because of serious illness, extreme personal circumstances, or scholarly reasons at the request of the instructor. If your record is such that you would fail the course regardless of your missing work, you will fail.

Software requirements

Students are expected to have access to Coq 8.13. Homework assignments consist of a Coq script or a paper that will be submitted to Gradescope (unless stated otherwise).

Attendance

Attendance is encouraged. In case of a student not being able to attend a class, the student should contact the instructor as soon as possible. Students are responsible for knowing everything that is covered during class meetings, including announcements. If you must be absent from a class meeting, make arrangements with another student to find out what you missed.

Homework

- The final grade of each assignment is given by the instructor (not the grading software)
- No late homework will be accepted. The reception of assignments is done automatically.
- You may **not** collaborate with anyone else on any homework. Each homework represents your own, individual work.
- It is *acceptable* to discuss the concept in general terms, but *unacceptable* to discuss specific solutions to any homework assignment.
- Homework assignments will be automatically scanned for plagiarism against the present year and all past years of this course.

Presentations

Students will be arranged in groups (up to 3 students). Each student in a group must have a different advisor. Each student must present a part of a presentation (10 minutes). The final grade for the presentation component includes peer-reviewing: each student must review their colleagues presentations (excluding the members of their group). Reviews will be graded by the instructor.

Student Conduct

Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct as delineated in the catalog of Undergraduate Programs, pp. 44-45, and 48-52. The Code is available online.³

- **This course follows a ZERO-TOLERANCE cheating policy.** Any student breaking the Code of Student Conduct will get an F in this course and will be reported according to §II Academic Dishonesty Procedures.⁴
- Every solution submitted to our grading server is automatically compared against a solution database for plagiarism, which includes every solution from every student in past semesters.

Accommodations

This class seeks ways to become a working and evolving model of inclusion and universal design for all participants. Individuals with disabilities of any kind (including learning disabilities, ADHD, depression, health conditions), who require instructional, curricular, or test accommodations are responsible for make such needs known to the instructor as early as possible. Every effort will be made to accommodate students in a timely and confidential manner. Individuals who request accommodations must be registered with the Ross Center for Disability Services, which authorizes accommodations for students with disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services,⁵ M-1-401, (617-287-7430). The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of Drop/Add period.

³http://www.umb.edu/life_on_campus/policies/code/

⁴https://www.umb.edu/editor_uploads/images/life_on_campus/FINALUMBCode9-5-18-Appendix_B_V2.pdf

⁵<https://www.rosscenter.umb.edu>