



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Course Code: CSE 2321
Course Title: Foundations I–Discrete Structures
Autumn 2021. Credit Hours: 3.0
Course Website: <https://u.osu.edu/alzalg.1/teaching-sp22>



Department of
Computer Science and Engineering

Instructor Name: Dr. Baha Alzalg
Personal Website: <http://u.osu.edu/alzalg.1>
Office Location: DL 258
Email: baha2math@gmail.com (preferred)
alzalg.1@osu.edu
Phone: (614) 247-7331 (gmail preferred)
Office Hours: MWF 9:40-10:10A

Course and Graders Information:

Course Information				Graders Information	
Section	Days	Time	Room	Name	Email
34444	MWF	10:20A-11:15A	CH0312	TBD	TBD
25610	MWF	12:40P-01:35P	CH0312	TBD	TBD
				TBD	TBD

Course Description: Propositional logic, Boolean algebra, first-order logic, sets, functions, graphs and trees, analysis of algorithms, asymptotic analysis, combinatorics, graph algorithms.

Prerequisite(s) and Co-requisite(s):

(1) CSE 2122, CSE 2123, or CSE 2221.

(2) Math 1151, or Math 1161.

Co-requisite for those entering with CSE 2221: CSE 2231.

Textbook: *Introduction to Algorithms*, 3rd Edition, by Cormen, Leiserson, Rivest, and Stein (CLRS). This textbook will be used for both the Foundations I and Foundations II courses.

There is an eBook available in the OSU library by accessing. It is a single-use access which means that only one student can use it at a time. See <https://library.ohio-state.edu/record=b6916144~S7>

Readings:

- From the MIT open courseware: “Logic.” This is available online.
- From the CLRS textbook: Appendices A, B, C.1, and D.1; Chapters 1, 2, 3, 4, and 22.
- **Additional resources/books may be added during the semester.**

References:

1. *Discrete Mathematics and Its Applications*. By Kenneth Rosen. 7th edition.
2. *Foundations of Computer Science*. By A.V. Aho and J.D. Ullman. (C edition). Computer Science Press.
3. *An Active Introduction to Discrete Mathematics and Algorithms*. By C.A. Cusack and D.A. Santos. (Version 2.6.4). Available online.

Course Objectives:

At the completion of this course, students should be able to:

1. Be competent with using propositional logic.
2. Be familiar with first-order predicate logic.
3. Be familiar with proving by contradiction, by ordinary induction and by strong induction.
4. Be familiar with using asymptotic notation.
5. Be familiar with analyzing running time of simple iterative algorithms.
6. Be familiar with graph theory.
7. Be exposed to analyzing running time of recursive algorithms.
8. Be exposed to sorting and searching.
9. Be exposed to designing graph algorithms.

Course Topics:

- Propositional logic.
- Predicate logic and related topics.
- Fundamentals of runtime analysis.
- Analyzing time complexity of algorithms.
- Graph concepts and fundamentals.
- Graph searching algorithms.

Grade Distribution:

Homework Assignments	18%
The First Exam	18%
The Second Exam	19%
The Final Exam	39%
Attendance, Participation, etc.	06%

Important (Tentative) Dates:¹

Mo.	Jan. 10	First Day of Class
Mo.	Jan. 17	Martin Luther King Jr. Day - no classes
Mo.	Feb. 14	First Exam
Mo.-Fr.	Mar. 14-18	Spring Break
Mo.	Mar. 28	Second Exam
Mo.	Apr. 25	Last Day of Classes
We.-Tu.	Apr. 27 - May 3*	Final Exams

How This Course Works:

- **Mode of Delivery and Attendance:** This course is in-person. Most (if not all) of the course material will be presented in the classroom. By the university rules, the instructor is allowed to give a portion of the classes virtually (online via Zoom). If some classes are given online, I will announce about them in advance. Lectures will not be recorded unless they are given virtually. Only online classes (if any) will be recorded or pre-recorded and the recordings will be posted on Carmen or the Course Website.

It is important that you attend class regularly. Attendance is expected and will be taken each class. Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials. Electronic devices must be put away during class unless they are being used specifically for that days lecture.

- **Communication:** – Information regarding the course will be posted on Carmen or the Course Website. CSE 2321 is not an online course. Students are responsible for any announcements/information provided on the Course Website/Carmen.
- **Credit Hours and Work Expectations** This is a 3-credit-hour course. According to Ohio State policy, students should expect around 3 hours per week of time spent on direct instruction (instructor content, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.
- **Office hours: OPTIONAL**
All my office hours, which are from 9:40-10:10A on MWF (except holidays), will be scheduled in my office (DL 258) and are optional.
- **Homework Assignments**
 - There will be around 12 online homework assignments (every week except possibly in: Week of Jan. 10-14 (the first week of instruction), Week of Mar. 14-18 (of Spring break), and Week of Apr. 18-22 (the last week of instruction)).
 - Homework assignments and solutions will be posted regularly on the Course Website or Carmen.
 - Homework assignments are 18% of your final grade and each homework assignment will be worth 15 points.

¹Below is a link to the Registrar's Academic Calendar which includes drop dates, etc:

<https://registrar.osu.edu/staff/bigcal.asp>

Please note that this calendar is subject to change.

★Final exams is determined by the OSU Registrar. Below is the link to final exam schedule:

<https://registrar.osu.edu/scheduling/SchedulingContent/AU19Finals.pdf>

- Homework assignments are due at the start of class on each Monday except for holidays. In the “no class” days, homework assignments are due at the start of class on the following Wednesdays.
- The assignment are considered late after the due time. The late homework assignment could then be submitted in any time before I post its solution on the Course Website or Carmen and before the grader finishes its grading for a 15-30% possible penalty of the point value of the assignment. No assignments will be accepted after the homework solution is posted on the course website or after the grading of that homework assignment is completed by the grader. **PENALTIES ON LATE SUBMISSIONS WILL NOT BE WAIVED UNDER ANY CIRCUMSTANCES. AND NO EXCEPTIONS WILL BE MADE UNDER ANY CIRCUMSTANCES.**
- Homework assignments are required to be done individually. While study groups and discussion of assignments is encouraged, remember that copying or comparing answers on a quiz or homework is not permitted. Please write your name, assignment name, and section at the top of all pages and make sure all pages are in one single file.
- Reusing past work: In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you have explored in previous courses, please discuss the situation with me.

- **Exams**

- Exams are closed notes, closed book.
- You must complete the first, second and final exams yourself, without any external help or communication.
- The final exam is comprehensive. The date/time of the final exam is determined by the OSU Registrar. Final exams may not be taken early.
- Exams are in-person. However, if we could make an online Exam, it will be on Carmen Assignments and we will use the Proctorio online proctoring platform supported by OSU and Carmen.
- Makeup exams require that appropriate documentation be provided ahead of time and are up to the discretion of the instructor.

- **Grading Scheme**

The OSU grading scheme is used to determine final grades.

Academic Misconduct:

Students are required to follow the Ohio State “Code of Student Conduct” which can be found at http://studentaffairs.osu.edu/pdfs/csc_12-31-07.pdf. Among the other restrictions, pay specific attention to the section on Academic Misconduct. Among the restrictions, students are prohibited from:

- Providing or receiving information during exams
- Providing or receiving assistance on homework other than as outlined elsewhere on this syllabus
- Submitting plagiarized (i.e. copied but unacknowledged) work for credit

Note: Faculty is required by the University to report any suspected violation of these conditions to the Council on Academic Misconduct. Misconduct cases are resolved via the CoAM's hearing processes. More about this process can be found at: <http://oaa.osu.edu/coam.html>

Course Technology:

For help with your password, university email, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at: <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24/7.

- Self-Service and Chat support: <http://ocio.osu.edu/selfservice>
- Phone: 614-688-HELP (4357)
- Email: 8help@osu.edu
- TDD: 614-688-8743

Faculty Feedback and Response Time:

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call 614-688-HELP at any time if you have a technical problem.)

- Grading and feedback: For weekly homework assignments, contact your grader by email or meet with him/her in his/her scheduled online office hour. You can generally expect feedback within 7 days. After contacting the grader, you can contact me directly by talking to me in my office hours or emailing me.
- I will reply to emails within 24-48 hours on days when class is in session at the university (So, weekends and holidays are excluded from 24-48 hours rule).

Copyright Disclaimer:

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on Title IX:

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at: <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu.

Your Mental Health: A recent American College Health Survey found stress, sleep problems, anxiety, depression, interpersonal concerns, death of a significant other, and alcohol use among the

top ten health impediments to academic performance. Students experiencing personal problems or situational crises during the quarter are encouraged to contact Ohio State University Counseling and Consultation Service (614-292-5766; www.ccs.osu.edu) for assistance, support and advocacy. This service is free and confidential.

Health and safety requirements:

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (<https://safeandhealthy.osu.edu>), which includes following university mask policies and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.

Accessibility Accommodation for Students with Disability

Requesting Accommodations: If you would like to request academic accommodations based on the impact of a disability qualified under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, contact your instructor privately as soon as possible to discuss your specific needs. Discussions are confidential.

In addition to contacting the instructor, please contact the Student Life Disability Services at 614-292-3307 or ods@osu.edu to register for services and/or to coordinate any accommodations you might need in your courses at The Ohio State University.

Go to <http://ods.osu.edu> for more information.

Tentative Schedule, and Topics Covered:

The weekly coverage **might change** as it depends on the progress of the class. For the most up to date information on assignments and their due dates, announcements will be made on Carmen.

Week	Details
1	<ul style="list-style-type: none"> • (Lec 1) [First Day of Class] General intro, intro to propos logic • (Lec 2) Truth tables, logical operators (negation, and, or) • (Lec 3) Implication
2	<ul style="list-style-type: none"> • (Lec 4) Contrapositive, converse, inverse, biconditional • (Lec 5) Tautology, contradiction, contingency, negating compd stats
3	<ul style="list-style-type: none"> • (Lec 6) Propositional logic modeling, important laws • (Lec 7) Disjunctive normal form, conjunctive normal form
4	<ul style="list-style-type: none"> • (Lec 8) Intro to predicate logic, quantifiers • (Lec 9) Multiple quantifiers • (Lec 10) Symbolizing statements
5	<ul style="list-style-type: none"> • (Lec 11) Intro to set theory • (Lec 12) Power set, manipulating sets, operations, specification • (Lec 13) Mathematical induction, summations
6	<ul style="list-style-type: none"> • Review for first exam and more • (Lec 14) Intro to algorithmic analysis, constructing algorithms • (Lec 15) Line-by-line runtime analysis, insertion sort
7	<ul style="list-style-type: none"> • (Lec 16) Summation representations for looping • (Lec 17) Upper and lower bounds for running time • (Lec 18) Asymptotic notations
8	<ul style="list-style-type: none"> • (Lec 19) Properties of the notations • (Lec 20) The notations in terms of limits • (Lec 21) Determining Big-Oh of algorithms
9	<ul style="list-style-type: none"> • (Lec 22) Analyzing typical programs, linear search, selection sort • (Lec 23) Analyzing nonrecursive programs • (Lec 24) Analyzing recursive progs, binary search, merge sort
10	<ul style="list-style-type: none"> • (Lec 25) Iteration method for solving recurrences • (Lec 26) Substitution method for solving recurrences
11	<ul style="list-style-type: none"> • (Lec 27) Recursion-tree method for solving recurrences • Review for second exam and more • (Lec 28) Intro to graph theory
12	<ul style="list-style-type: none"> • (Lec 29) Graph terminology and properties • (Lec 30) More properties, Eulerian path/cycle
13	<ul style="list-style-type: none"> • (Lec 31) Hamiltonian path/cycle, graph coloring • (Lec 32) Directed graphs • (Lec 33) Graph representation
14	<ul style="list-style-type: none"> • (Lec 34) Breadth-first search algorithm • (Lec 35) Depth-first search algorithm
15	<ul style="list-style-type: none"> • (Lec 36) Topological sorting • Final review [Last Day of Class]
16	<ul style="list-style-type: none"> • We, Apr. 27 – Tu, May. 3: [The Final Exam]