**Syllabus for CS 212 – Discrete Structures**

Hello! My name is David Furcy and I am the instructor for this course. Feel free to call me "*David* " or "*Mr./Prof. Furcy*", whichever is most comfortable to you. I want all of you to succeed and thrive in my course. As a result, I have designed all of its components to help you successfully achieve its learning objectives.

Important aspects of this course that may help you decide whether it is a good fit for you:

- This is a required course for all CS majors.
- This is a highly-structured course that includes activities that provide daily practice with the skills required to do well on quizzes and exams.
- There will be weekly quizzes and three exams.
- There is a required, relatively cheaper e-book to buy for this course that you will use daily to gain mastery of the course material.

***I am available to help you every weekday by email, during office hours*** (no appointment needed; see following page), ***as well as outside office hours***, by appointment, and ***whenever my office door is open***.

More generally, my overarching goals as a teacher include the following:

1. Students from all diverse backgrounds/perspectives will be well-served by this course.
2. My students' learning needs will be addressed both in and out of class.
3. The diversity that students bring to this course will be a resource and strength for all.

Your suggestions are encouraged and appreciated. Please let me know of any ways I can improve the effectiveness of this course for you personally, or for other students or student groups. If you prefer anonymity for such feedback, feel free to use this feedback/question form.

If there are aspects of the design, instruction, and/or experiences within this course that result in barriers to your inclusion or accurate assessment of achievement, please notify me as soon as possible and/or contact the Accessibility Center (see below).

**Accommodations**

The University of Wisconsin Oshkosh supports the right of all enrolled students to a full and equal educational opportunity. It is the University's policy to provide reasonable accommodations to students who have documented disabilities that may affect their ability to participate in course activities or to meet course requirements.

Students are expected to inform instructors of the need for accommodations as soon as possible by presenting an Accommodation Plan from either the Accessibility Center, Project Success, or both. Reasonable accommodations for students with disabilities is a shared instructor and student responsibility.

The Accessibility Center is part of the Dean of Students Office and is located in 125 Dempsey Hall. For more information, email accessibilitycenter@uwosh.edu, call 920-424-3100, or visit the Accessibility Center Website.

**Disclosure**

Students are advised to see the following URL for disclosures about essential consumer protection items required by the Students Right to Know Act of 1990:
https://uwosh.edu/financialaid/resources/consumer-information/

**Course Number:** CS 212
**Course Title:** Discrete Structures
**Credits:** 3 credit hours
**Semester:** Fall 2023
**Instructor:** David Furcy
**Email:** furcyd@uwosh.edu
**Office Hours:** MWF 10:10 – 11:10 AM Location: HS 221
TuTh 9:30 – 11:00 AM
or by email and/or appointment
**Class Meetings:** MWF 12:40 – 1:40 PM Location: HS 208
**Prerequisites:** CS 262 and (Math 171 or Math 206) each with a grade of C or better

**Class Web Page:** Canvas

**You are expected to check the CS 212 Canvas course web site daily** since it will be constantly updated with materials for this course including daily slides, daily reading assignments, daily zyBook activities, homework assignments, and video links. **You are also expected to check your email daily** for course announcements.

**Required Text:** We will be using a zyBook for this class. Follow these instructions:

1. Click on a zyBook link in Canvas (e.g., the Z1 link in the Day 1 module). Do NOT go to the zyBooks website to create a new account.
2. Subscribe

A subscription is **$58**. Students may begin subscribing on August 23, 2023. Subscriptions will last until December 29, 2023.

**Tests:** Exam #1: Week of October 2 (± one week with 10-day prior notice)
Exam #2: Week of November 6 (± one week with 10-day prior notice)
Exam #3: Week of December 11

**Catalog Course Description:**
This course focuses on discrete mathematical structures that are essential to computer scientists. In this course, students will develop their analytical and algorithmic thinking skills through practice with propositional and first-order predicate logic, various proof techniques, mathematical and structural induction, sets, functions, sequences, recurrence relations, algorithm analysis and computational complexity, the basics of counting, and in introduction to discrete probability.

**Course Outcomes:** At the end of the course, students will be able:

1. To use the basic principles of propositional and predicate logic to prove logical statements.
2. To prove a mathematical statement using the principle of induction (mathematical, strong and structural).
3. To prove a mathematical statement using an indirect proof (i.e., proof by contradiction, proof by contrapositive).

4. To prove a mathematical statement using a direct proof (i.e., proof by construction.
5. To explain the basics of set theory (union, intersection, complement, subset, cardinality, power set, cross product, equality of two sets).
6. To explain the basics of mathematical functions (definition, composition, domain, range, inverse, injective, surjective) and relations (definition, equivalence, inverse, composition, partial orderings, and total orderings).
7. Given a recursive algorithm, to formulate a recurrence equation that describes its running time.
8. Given a recurrence equation that describes the running time of some algorithm, to solve the recurrence relation, using a standard technique such as iteration or the Master Theorem, in order to derive the running time of the algorithm.
9. To explain basic combinatorial principles (combinations, permutations, principle of inclusion-exclusion, pigeonhole principle, binomial coefficients).
10. To identify and apply basic probability concepts.

**Course Grading Policy:** Your final grade for this course will be based on the following six components:

a) **Daily zyBook assignments (Z1, Z2, etc.):** On most class days (MWF), you will be assigned a selection of sections from our zyBook to read before 11:00 AM. Each reading assignment will include (orange) participation activities and/or (blue) challenge activities that **must** also be completed by the same deadline as the reading. **No late submissions will be accepted**. Your daily scores on these activities will be added up to make up your final score for this component. Note that the participation activities cover topics that will be discussed later that day in class. On the other hand, the challenge activities cover topics that were discussed in the previous class. You are given two or three extra days to complete the challenge activities to make sure that you have time to reread both the zyBook sections and your class notes and to ask lingering questions before being testing on the material.

b) **Weekly quizzes (Q1, Q2, etc.):** You will have to complete a weekly quiz on the material covered during the week(s) prior to quiz day. These quizzes will be completed in closed-book conditions (with no notes or calculator allowed) at the end of a regular class session. Your scores on these quizzes will be added up to make up your final score for this component.

c) **Homework assignments (A0, A1, etc.):** All assignments must be written in LaTeX and the corresponding pdf file must be submitted electronically on Canvas. Each assignment must be submitted by 11:00 AM on the due date. **No late submissions will be accepted**. It will also be your responsibility to ensure your assignment was submitted correctly. To avoid a penalty, you must re-download your submission and check that you did not submit the wrong file by mistake. Your scores on these assignments will be added up to make up your final score for this component.

d) **Three exams (E1, E2, E3):** There will be three exams taken during regular class periods.

Your overall numerical grade for the course will be computed as the weighted sum of the component grades using the following weights:

| Component | Weight |
|---|---|
| Daily zyBook assignments | 14% |
| Weekly quizzes | 13% |
| Homework assignments | 13% |
| Exam #1 | 20% |
| Exam #2 | 20% |
| Exam #3 | 20% |

Your final letter grade for the course will be computed using the following mapping:

| Numerical Score | Grade | Numerical Score | Grade |
|---|---|---|---|
| $\geq 92$ | A | $\geq 72$ | C |
| $\geq 90$ | A- | $\geq 70$ | C- |
| $\geq 88$ | B+ | $\geq 68$ | D+ |
| $\geq 82$ | B | $\geq 62$ | D |
| $\geq 80$ | B- | $\geq 60$ | D- |
| $\geq 78$ | C+ | $< 60$ | F |

While this overall grading scheme is fixed, I will be happy to discuss any issue you may have with individual grades. If you notice a mistake or have a question regarding a specific grade, please contact me *as soon as possible*. Do not wait until the end of the semester to bring up grading issues.

**Attendance and participation:** You are expected to not only attend **every** class meeting but also to come **prepared** for and participate actively in it. Necessary preparation requires you to have studied and assimilated the material covered in previous sessions, to have talked with the instructor outside of class to discuss any questions you may have, to have completed the reading assignments and associated zyBook activities, and to have completed prior assignments on time.

Note that the reading assignments and associated zyBook activities account for 14% of your overall course grade. In fact, they are even more important to your success since the learning they foster will impact your mastery of the material and thus your performance in the course as a whole, which will be tested in quizzes and exams.

**It is hard to imagine how a student could do well in this course while missing classes or assignments, attending classes unprepared, or not participating during/between them.**

On the positive side, I have high expectations for my students and will always support and encourage you. I **strongly encourage** you to **ask any question** or raise any issue you have with the course either during or at the end of class, or during my office hours. I will also gladly meet with you by appointment. Send me email to make an appointment. While I will meet with you as soon as my schedule permits, do not expect me to be widely available just before a big deadline, since many students may ask for help at the last minute.

**Late submissions:** THERE WILL BE NO LATE SUBMISSIONS ACCEPTED ON ANY COMPONENTS OF THIS CLASS. If your submission reaches me after the due date/time (even if it is late by only a few seconds, as recorded by Canvas), I will not grade it and you will receive a **zero**. Late

submissions can easily be avoided by starting to work on each assignment right away and asking questions early if you get stuck.

The zero-score for late submissions can be waived in **only one** scenario, namely if you give me a signed note from a doctor or a written justification for the extension from the Dean of Students Office. If you miss an exam, you **may** be able to take a make-up exam provided you give me a valid justification (see above) ahead of time if possible. Only one make-up exam will be given. It will be a comprehensive exam scheduled at the end of the semester. If you miss a quiz, you **may** be able to take a make-up quiz, provided you have a valid justification for your absence.

**Collaboration versus Cheating:** All submissions must be the work of only one student, namely the one whose name appears on the submission. While it is acceptable and encouraged to discuss the reading assignments with others, you must submit your own work unless you can live with a zero and the other potential academic sanctions of cheating. Check out the UWO Student Academic Disciplinary Procedures (UWS 14) for details.

In conclusion, remember that computer science classes require a lot of work in addition to active participation in class. It takes considerable practice to develop the technical and analytical skills targeted by this course. You will need to spend **at least (and possibly much more than) three hours of effort outside of class for each in-class hour**. Having said this, I expect every hardworking student to do well in this course with my help, whenever it is requested.

**Have fun this semester and good luck!**