**CS5084 Algorithms – Design and Analysis**

**Computer Science**

**Spring 2022**

**Instructor:**

Prof. Joseph Johnson

Email: [jejohnson2@wpi.edu](mailto:jejohnson2@wpi.edu)

**Textbook:**

**Required:**

Algorithm Design. J. Kleinberg, E. Tardos, Addison-Wesley. 2006. ISBN-10: 9780321295354.

**Reference:**

Introduction to Algorithms (3rd Edition). Thomas Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein. MIT Press. 2009. ISBN-10: 9780262033848.

**Course Description:**

This course covers the topics of design and analysis of computer algorithms. Specifically, this course introduces the following types of algorithm designs: breadth first search, depth first search, greedy, divide and conquer, dynamic programming, and network flow. This course also looks at algorithm analysis techniques including worst case and average case analysis. Finally, this course covers the concept of NP completeness and intractability.

**Course Dates:**

01/12/2022 - 05/03/2022

**Updates to this Document:**

Excluding materials for purchase, syllabus information may be subject to change. The most up-to-date syllabus is located within the course in Canvas.

**Prerequisite Courses:**

An undergraduate knowledge of discrete mathematics and data structures.

**Learning Outcomes:**

By the completion of this course, learners will be able to:

* Compute the computation time of algorithm as a function of the size of the input.
* Design algorithms using appropriate techniques we cover in class, including greedy, dynamic programming, BFS, DFS, divide and conquer, and network flow techniques.
* Determine the algorithmic complexity of a problem with respect to P and NP.

**Communication:**

The principal means of communication are as follows:

* Announcements in the LMS. (Be sure to monitor your email as any announcements will be forwarded to your email address.)
* Virtual Office Hours: Tuesday 1:30 – 3:00
* Email: [jejohnson2@wpi.edu](mailto:jejohnson2@wpi.edu) (I should respond within 24 hours, except on weekends where it is possible I may not respond until Monday morning.)
* Online discussions to be conducted regularly on the course website.

**Course Approach:**

Highlights:

* This is a 15-week course, where each week opens at 10:00 am on Monday, and ends at 11:59 pm the following Sunday.
* Each week, new material will be posted on the LMS in Course Content folder, labeled Lecture XX – YYY, where XX corresponds to the week of the course and YYY is the title/topic for that week's lecture.
* Each week's materials will include a collection of short-segment video lecture segments, organized by topic. Lecture slides will be discussed and software demonstrations will be given in the videos.
* Assignment work must be submitted by 11:59 pm on Sunday of the week the assignment is due.

**Grading, Assignments, and Exams:**

There will be 6-7 problem sets throughout the semester. The exact number will vary based on how problems are grouped into assignments as we progress through the material. *These assignments are to be submitted on Canvas, as a pdf document*. The problem sets can be typed or hand-written and the programming assignments must be typed. For those with particularly messy handwriting, however, typing will probably save frustration between you and the grader.

**Grade Determination:**

|  |  |
| --- | --- |
| 7-14 Written Homework/Programming Assignments: | 50% |
| Midterm 1: | 15% |
| Midterm 2: | 15% |
| Final Exam: | 20% |

**Late Work Policy:**

Late work is not accepted.

**Technical Requirements:**

You will need reliable internet access, word processing software, and Adobe Acrobat Reader.

**Library Access:**

As a student at WPI, you have access to a variety of resources through the library. Use the link [here](http://www.wpi.edu/academics/Library/) to access databases, e-journals, and/or e-books. You will be required to log in with your WPI username and password to access materials.

**POLICIES**

**Academic Integrity:**

You are expected to be familiar with the *Student Guide to Academic Integrity at WPI* that is downloadable from [here](http://www.wpi.edu/offices/policies/studentguide.html). Consequences for violating the Academic Honest Policy range from earning a zero on the assignment, failing the course, or being suspended or expelled from WPI.

Common examples of violations include:

* Copying and pasting text directly from a source without providing appropriately cited credit
* Paraphrasing, summarizing, or rephrasing from a source without providing appropriate citations
* Collaborating on individual assignments
* Turning in work where a good portion of the work is someone else’s, even if properly cited

**Academic Accommodations:**

We at WPI strive to create an inclusive environment where all students are valued members of the class community. If you need course adaptations or accommodations because of a disability, or if you have medical information to share with us that may impact your performance or participation in this course, please make an appointment with us as soon as possible. If you have approved accommodations, please request your accommodation letters online through the Office of Disability Services student portal. If you have not already done so, students with disabilities who need to utilize accommodations for this course are encouraged to contact the Office of Disability Services as soon as possible to ensure that such accommodations are implemented in a timely fashion.

Email – [DisabilityServices@wpi.edu](mailto:DisabilityServices@wpi.edu)

Phone – (508) 831-4908

On Campus – Daniels Hall, First Floor 124

**Grading Policy:**

Final course grades are based on a student’s performance as follows:

|  |  |
| --- | --- |
| Letter Grade | Percentage |
| A | 90 - 100 |
| B | 80 - 89 |
| C | 70 - 79 |
| D | 60 - 69 |
| F | < 60 |

Course incompletes may be granted if the major part of the course is completed; however, no additional credit can be given for missed class discussions or teamwork beyond the end of the course. In addition, in the case of an incomplete, the student is responsible for handing in the final work within the WPI required timeframe of one (1) year. After this time, an incomplete grade changes to a failing (F) grade.