CS620: Applied Algorithms, Spring 2019
Weisberg Division of Computer Science
Marshall University

Course Information:

- Instructor: Dr. Cong Pu (Ph.D., Assistant Professor)
- Office: Weisberg Applied Engineering Complex (WAEC) 3109
- Phone: (304) 696-6204
- Email: puc@marshall.edu
- Course meetings: Mon/Wed, 3:00 p.m. – 4:15 p.m., WAEC 1105
- Tentative office hours: Mon, 9:00 a.m. – 12:00 p.m., 1:00 p.m. – 3:00 p.m.
  Wed, 9:00 a.m. – 12:00 p.m., 1:00 p.m. – 3:00 p.m.
  Or by appointment.
- Course web page: (MUOnline) http://www.marshall.edu/muonline/. It is important to visit MUOnline regularly for up-to-date course information.

Course Description: From Catalog

- Study of clustering, graph-theoretic, genetic, probabilistic and randomized algorithms and their application to machine learning, data streams, data mining, computer vision, natural language processing, information retrieval, and bioinformatics.

Course Objectives:

- This course will introduce students destined for research in all different areas to the important current themes in algorithm design.

Course Student Learning Outcomes: The table below shows the following relationships: How each student learning outcomes will be practiced and accessed in the course.

Course Student Learning Outcomes	How students will practice each outcome in this course	How student achievement of each outcome will be assessed in this course
Ability to analyze algorithms with various methods: iteration, substitution, recursion tree and master theorem	Lecture Example In-class exercise	Assignment Quiz Exam
Familiarity with different techniques for algorithm design	Lecture Example In-class exercise	Assignment Quiz Exam
Understanding of design and analysis of algorithms for sorting and selection problems	Lecture Example In-class exercise	Assignment Quiz Exam
Ability to apply appropriate algorithms to given problems	Lecture Example In-class exercise	Assignment Quiz Exam

Preferred Communication Method and Expected Response Time:

- You can always see me during office hours. No appointment is required.

- You can generally expect an email response within 12 hours. If you don't get a response within 12 hours, please forward your previous email to me to remind me.
- You can generally expect the feedback on assignment, review quiz, and exam in one week after submission. If you don't receive the feedback in two weeks, please send an email to me.

Required Textbooks, Additional Reading, and Other Materials:

- A list of reference books will be used. For more information, please refer to the following resources:
    - Jon Kleinberg and Eva Tardos. *Algorithm Design*. Pearson, 2005. ISBN-13: 9780321295354
    - Charles Leiserson, Thomas Cormen, Clifford Stein, Ronald Rivest. *Introduction to Algorithms*, 3rd Edition. MIT Press, McGraw-Hill. 2009. ISBN-10: 0262033844, ISBN-13: 978-0262033848.
    - Daphne Koller and Nir Friedman. *Probabilistic Graphical Models: Principles and Techniques*. The MIT Press. 2009. ISBN-10: 0262013193, ISBN-13: 978-0262013192.
    - Michael Mitzenmacher and Eli Upfal. *Probability and Computing: Randomized Algorithms and Probabilistic Analysis*. Cambridge University Press. 2005. ISBN-10: 0521835402, ISBN-13: 978-0521835404.
    - Gregoire Montavon, Genevieve Orr, and Klaus-Robert Muller. *Neural Networks: Tricks of the Trade*. Second Edition. Springer, 2012.
    - Kevin P. Murphy. *Machine Learning: A Probabilistic Perspective*. The MIT Press, 2012.
    - Amiya Nayak and Ivan Stojmenovic. *Handbook of Applied Algorithms: Solving Scientific, Engineering, and Practical Problems*. John Wiley, 2008. ISBN-10: 0470044926, ISBN-13: 978-0470044926.
- Important concepts/materials will be included in the lecture notes from various sources and posted on MUOnline.

Course Requirements and Grading Policy:

- **1st Exam: 15%, Feb 13 (Wednesday), 3:00 p.m. – 4:15 p.m., WAEC 1105**
- **2nd Exam: 15%, Mar 20 (Wednesday), 3:00 p.m. – 4:15 p.m., WAEC 1105**
- **3rd Exam: 15%, May 6 (Monday), 3:00 p.m. – 5:00 p.m., WAEC 1105**
    - Closed book and closed notes. You are required to bring your student ID for the exams.
    - There will be **NO** make-up for missing exam. Only university excused absences with appropriate and official **DOCUMENTATION** will be accepted for make-up exam.
    - If you want to take a conflict exam, you must talk to instructor and provide a valid document at least two weeks before the scheduled exam. The conflict exam must be taken within two days after the scheduled exam.
- **Review Quiz: 15%**
    - Review quiz will **NOT** be announced in advance, so **attendance is highly required**.
    - There will be **NO** make-up for missing review quiz. Only university excused absences with appropriate and official **DOCUMENTATION** will be accepted for make-up review quiz.

- **Assignments: 40%**
  - Assignments should be **SUBMITTED** on **Blackboard** before due date. Other submission methods will **NOT** be accepted.
  - **LATE** submission will **NOT** be accepted on Blackboard, since the submission link will be closed automatically.
  - Assignment will be graded based on the posted assignment grading guideline.
- **Plagiarism Detection:**
  - Moss (Measure Of Software Similarity) will be used to determine the similarity of programs, https://theory.stanford.edu/~aiken/moss/.
  - The instructor will examine the parts of codes that Moss highlights and make a decision about whether there is a plagiarism or not.
  - Plagiarism or cheating will not be tolerated in the class.
    - 1st plagiarism will result in zero point in the suspected code or work.
    - 2nd plagiarism will result in immediate dismissal (F grade).
- Grade Scale:
  - A (100 - 90), B (89 - 80), C (79 - 70), D (69 - 60), and F (59 - 0)

Attendance and Classroom Policy:

- Students are expected to attend punctually all class meetings, from the beginning of the semester until the end of the semester.
- If a student misses a class without university excused absence, the student should not expect individualized instruction on what was missed. This will be effective from the beginning of semester.
- Students are expected to assist in maintaining a classroom environment that is conducive to learning. In order to assure that all students have the opportunity to gain from time spent in class, unless otherwise approved by the instructor, students are prohibited from engaging in any other form of distraction. Inappropriate behavior in the classroom shall result, minimally, in a request to leave class.
- Inappropriate behaviors include but not limited to:
  - Web surfing, chatting, or gaming on electric devices
  - Late for class
  - Sleeping during class
  - Leaving without proper excuse

Marshall University Policy: By enrolling in this course, you agree to the University Policies. Please read the full text of each policy (listed below) by going to Academic Affairs: Marshall University Policies. (URL: http://www.marshall.edu/academic-affairs/policies/)

- Academic Dishonesty Policy
- Academic Dismissal Policy
- Academic Forgiveness Policy
- Academic Probation and Suspension Policy
- Affirmative Action Policy
- Dead Week Policy
- D/F Repeat Rule
- Excused Absence Policy for Undergraduates
- Inclement Weather Policy
- Sexual Harassment Policy

- Students with Disabilities (Policies and Procedures)
- University Computing Services Acceptable Use Policy

Course Schedule and Important Date: Topics and/or dates may be changed during the semester at the instructor's discretion because of scheduling issues, developments in the discipline, or other contingencies.

- Jan 14: Welcome & Java Programming Language
- Jan 16: Java Programming Language
- **Jan 21: Martin Luther King, Jr. Holiday – University closed**
- Jan 23: C Programming Language
- Jan 28: Basics of Algorithm Analysis
- Jan 30: Basics of Algorithm Analysis
- Feb 04: Basic Data Structures
- Feb 06: Basic Data Structures
- Feb 11: Sorting & Searching Algorithms
- **Feb 13: 1st Exam. Wednesday, 3:00 p.m. – 4:15 p.m., WAEC 1105**
- Feb 18: 1st Exam Discussion
- Feb 20: Sorting & Searching Algorithms
- Feb 25: Graph Algorithms
- Feb 27: Graph Algorithms
- Mar 04: Graph Algorithms & Clustering Algorithms
- Mar 06: Clustering Algorithms
- Mar 11: Clustering Algorithms & Greedy Algorithms
- Mar 13: Greedy Algorithms
- Mar 18: Greedy Algorithms
- **Mar 20: 2nd Exam. Wednesday, 3:00 p.m. – 4:15 p.m., WAEC 1105**
- **Mar 25: Spring Break Holiday – University closed**
- **Mar 27: Spring Break Holiday – University closed**
- Apr 01: 2nd Exam Discussion
- Apr 03: Divide and Conquer Algorithms
- Apr 08: Divide and Conquer Algorithms
- Apr 10: Divide and Conquer Algorithms & Dynamic Programming
- Apr 15: Dynamic Programming
- Apr 17: Dynamic Programming & Probabilistic and Randomized Algorithms
- Apr 22: Probabilistic and Randomized Algorithms
- Apr 24: Probabilistic and Randomized Algorithms
- Apr 29: "Dead Week"
- May 01: "Dead Week"
- **May 06: 3rd Exam. Monday, 3:00 p.m. – 5:00 p.m., WAEC 1105**

Grading Guidelines:

- Programming Assignment: (***Criterion include but not limited to***)
  - Plagiarism:
    - 1st plagiarism will result in zero point in the suspected code.
    - 2nd plagiarism will result in immediate dismissal (F grade).
  - Program has debugging error, or cannot be compiled, or has running time error, etc.: -40% to -60% of assigned grade
    - Depending on the quality and logic of the program.
    - Please note, the instructor will not debug and fix error in the program.
  - Program Specifications / Correctness: -10% to -40% of assigned grade
    - Program only functions correctly in very limited cases or not at all.
    - The details of the assignment specification are violated.
    - Depending on the quality and logic of the program.
  - Readability: -5% of assigned grade
    - Using indentation inconsistently; No whitespace (blank lines, spaces) where appropriate to help separate distinct parts of the code; The code is not well organized.
  - Documentation: -5% of assigned grade
    - Code uncommented or lacking meaningful comments.
  - Special Case: -90% of assigned grade
    - If a program does not meet the specifications at all / is entirely incorrect.
  - Others: -TBA% of assigned grade
    - It is not included in the abovementioned criteria, the instructor will announce in the class.

