**BUAD 5042 – Heuristic Algorithms,** Spring 2022, 1.5 Credits

**Course Meeting Times/Day:**

Section 1: 11:00AM – 12:20PM, Tuesday & Thursday

Section 2: 12:30PM – 1:50PM, Tuesday & Thursday

And Fridays (March 25, April 1, and April 15 – double session on April 15)

**Course Meeting Location:** Miller 1027

**Prerequisites:** Optimization (BUAD 5022); **Corequisites:** Spring MSBA Courses

**Course Instructor:**

Joe Wilck, Ph.D., P.E.

W&M Office Phone: 757 – 221 – 2894

Mobile Phone: 434 – 390 – 4576 (If needed)

W&M Email: joe.wilck@mason.wm.edu [preferred contact method]

W&M Office: 3072 Miller Hall

Office Hours: Email for an appointment.

***\*Note, much of this course is based on Prof. Jim Bradley’s notes, assignments, etc.***

**Course Description:**

Most business problems are too large or too complex to be solved optimally, where the strict meaning of "optimal" means finding the provably best solution. Finding a solution that approximates the optimal solution is, therefore, the predominant mode of problem solving found in industry: these are called heuristic solutions. Many companies gain a competitive advantage by constructing heuristics that either find better solutions than do their competitors or find solutions more quickly. This course focuses on achieving such results by programming custom algorithms, which are a sequence of steps taken to provide a solution to a problem.

**Course Objectives:**

* Develop algorithms effectively
* Learn different logical approaches for developing algorithms
* Implement algorithms in Python code
* Develop your Python programming expertise further

**Course Materials:**

Course Materials: all of the course materials for this course will be provided to students free of charge via the course web page which are either materials that the instructor has written or that come from the databases to which the College of William and Mary subscribes. The lectures will be sufficient to do the assignment related to dynamic programming, but alternate references are available.

*Alternative Reference:*

Book: Introduction to Mathematical Programming, by Hillier and Lieberman, ISBN-10: 0079118291, ISBN-13: 978-0079118295 (Alternately, this book can be used: Introduction to Operations Research, by Hillier and Lieberman, ISBN-10: 0078414474, ISBN-13: 978-0078414473).

**Course Management:**

Blackboard (<https://blackboard.wm.edu/>): Course syllabus, notes, announcements, assignments, and other communication will primarily be through Blackboard. Students should check Blackboard for updates a few times per week. University email will primarily be used for communication; please have your Blackboard account forward to the email you check most often.

**Evaluation:**

This is a letter-grade class. Grades will be computed as follows:

Attendance and Participation: Expected [Individual]

Assignments: 100% [Individual and Group – assignment specific]

**Attendance and Participation:**

Attendance is mandatory and will be taken and participation will be tracked. Unexcused absences and tardiness will result in punitive deductions to your grade as per MSBA policy (keeping in mind that this is a half-semester course, so the policy for absences for a full semester course will be cut in half); the classification of absences will be the instructor’s prerogative. Class participation scoring will be based on how well you have interacted meaningfully in class with the professor and other students; thus, if you say nothing or say very little, you are not successfully participating. Meaningful interaction includes, but need not be exclusively one of the following: answering my difficult questions, relating insightful observations, or posing a question that provokes useful analysis or consideration of issues. Faithful attendance, therefore, factors into your class participation grade. You are expected to have read the assigned material for each class and to be ready to discuss it in class. You are expected to participate in class discussion and adhere to classroom policies. Note, during some classes we will have in-class activities/assignments that will be graded based on completion/effort.

**Assignments:**

There will be approximately one assignment per week (5 assignments in total). Four of the assignments will be individual assignments and one assignment will be a team assignment. Late work will be accepted with a punitive penalty. However, once the work is reviewed during class, then no late work can be accepted for that particular assignment. In general, work submitted 3 days after the deadline will not be accepted. Group work participation will be evaluated using a Team Member evaluation form. Assignments will be announced/assigned at the beginning of the week (i.e., Monday or Tuesday) and due on Sunday evenings.

**Assignment Category Definitions:**

Category A: An individual assignment. You may not receive help from anyone on this assignment. It must be 100% your own work. All questions concerning this assignment should be addressed to your professor. It is an honor code offense to give or receive any assistance on this assignment.

Category C: An individual assignment. You may work with others or receive help from a tutor on this assignment. You must, however, turn in your own original paper. You may not divide the work with others or copy another student’s paper. It would be an honor code offense to do so.

Category D: A group assignment. You may share information, discuss general concepts and approaches to the assignment with other groups. You may get help from a tutor. Each group must turn in their own work. You may not copy another group’s work. It would be an honor code offense to do so.

*Wilck’s Commentary on Category C Assignments:*

You may work with your classmates on the individual Category C assignments, but all the work that you turn in must be your own. In other words, two people cannot work together to generate one version of the homework solution and then simply turn in two copies of that one work product.

**Grading Criteria:**

Unless otherwise specified assignments will be graded on the following criteria:

* Code runs on instructor’s machine without changes and/or corrections
* Output generated will be compared (i.e., scored) against classmates
  + Scoring in the top 20% will ensure full credit for this criterion
  + Scoring in the top 50% will ensure 90% credit for this criterion
  + Scoring in the top 75% will ensure 85% credit for this criterion
* Speed (efficiency) of code and output generation will be compared (i.e., scored) against classmates
  + Scoring in the top 20% will ensure full credit for this criterion
  + Scoring in the top 50% will ensure 90% credit for this criterion
  + Scoring in the top 75% will ensure 85% credit for this criterion
* Flow-charts, write-ups (report), pseudo-code, as requested
* Quality of code and commenting

**Classroom Policies:**

* Mobile phones should not be used during class. However, if you receive an important call or text that requires your immediate attention, then the appropriate (professional) behavior would be to exit the classroom and handle your phone call or text message before returning.
* Computers should be brought to class. However, they should be used for class material and class assignments – not as a distraction (i.e., refrain from working on non-class items, social media, news outlets, etc.).
* Side conversations and other forms of distraction (including reading/working on other class assignments, etc.) are not acceptable. Sleeping in class is not acceptable (if you feel the urge to sleep, then stand in the back of the room).
* In general, please respect our time in class and be an active participant in our class’s learning community without impeding your classmates’ opportunity to learn, listen, and participate.

**Honor Code:**

The Pledge: "As a member of the William and Mary community, I pledge on my honor not to lie, cheat, or steal, either in my academic or personal life. I understand that such acts violate the Honor Code and undermine the community of trust, of which we are all stewards." (*https://www.wm.edu/offices/deanofstudents/services/communityvalues/honorcodeandcouncils/honorcode/)*

All assignments and attendance follow the Honor Code. It is assumed that all students will follow the honor code and honor pledge for all course interactions (including attendance, participation, assignments, computer use, Blackboard use, email use, etc.). The instructor will follow Honor Code procedures as specified by the College of William and Mary in handling any matters relating to any violations.

**Inclement Weather and/or other University Closures/Early Dismissals:**

The course will follow the College of William and Mary’s schedule (Dial 757-221-1766 for information regarding closures) [http://www.wm.edu/about/administration/provost/forfacstaff/weather/]. If a class is canceled by the university, then an alternative assignment (probably a video lecture) will be provided.

**Accommodation:**

William & Mary accommodates students with disabilities in accordance with federal laws and university policy. Any student who feels s/he may need an accommodation based on the impact of a learning, psychiatric, physical, or chronic health diagnosis should contact Student Accessibility Services staff at 757-221-2509 or at sas@wm.edu to determine if accommodations are warranted and to obtain an official letter of accommodation. For more information, please see www.wm.edu/sas.

**MSBA Policies:**

Professionalism:

a. Penalties for late assignments:

• Assignments turned in late will incur a 20% point deduction.

• Assignments turned in more than three days late will receive a grade of zero.

• Solutions will (may) be posted when all assignments are received but no later than three days after the due date.

b. Dress code

• Business Casual: The expected dress is long khaki pants and a button-down shirt, or dress of comparable formality.

• Casual Friday: formality of dress is relaxed on Friday, although attire should never be distracting, sloppy, or too revealing. For example, jeans and a polo shirt are acceptable: athletic shorts, pajamas, and sweatpants are not.

• Guest Speakers: dress is business causal on any day on which we are hosting a guest speaker.

c. Punctuality

• Three absences or instances of being tardy are allowed each semester in each course. ***(Full Semester Course; thus 2 absences or instances of being tardy for Heuristic Algorithms)***

• Absence and tardiness are treated equally.

• A 2% deduction will be taken from the final grade for each absence or late arrival for class after the first three up to a 10% total deduction.

• Attendance will be taken in each class session.

d. Comportment

• Stay seated during class: getting up in the middle of a lecture or guest speaker presentation and leaving the room disrupts class. Students who have medical issues with their backs may stand unobtrusively in the back of the room if necessary.

• Do not use cell phones or laptops during guest speakers’ presentations: Being busy on laptops or phone communicates disrespect for the speaker, the time they have committed to class, and what they are saying, regardless of whether you are taking notes or not.

• Do not take pictures of guest speakers’ materials or record their presentations: some guest speakers’ materials are confidential. Professors will record the presentation and distribute it to all students when materials can be distributed.

Group work

a. Team Contracting sessions will be held at the beginning of each semester for teams to determine how they will work together. These sessions help teams to mitigate dysfunctional dynamics that might otherwise occur. If any difficulties in working together should arise, each team is responsible for revisiting their team contract and working through the difficulties. If the team is unable to resolve its issues, then please contact Julie Hummel who will discuss our process for resolving such difficulties. This problem resolution process is rarely required.

b. A team may remove one of its members if the remaining members of the team vote unanimously to do so. The team must have first contacted Julie Hummel and attempted to work through the problem resolution process. The displaced teammate will be responsible for completing all remaining assignments on an individual basis.

c. Each team will provide feedback on their teammates through 360-degree surveys. Individuals’ grades will be adjusted according to the surveys when those surveys indicate a significant disparity among teammates’ contributions. The grades of teammates on a particular team, therefore, can vary and it is possible that an individual can receive a grade of zero if the surveys indicate no meaningful effort.

Grading Scale:

Letter grades will be assigned according to the MSBA Grade Scale:

A ≥ 95

94.99 ≥ A- ≥ 90

89.99 ≥ B+ ≥ 87

86.99 ≥ B ≥ 83

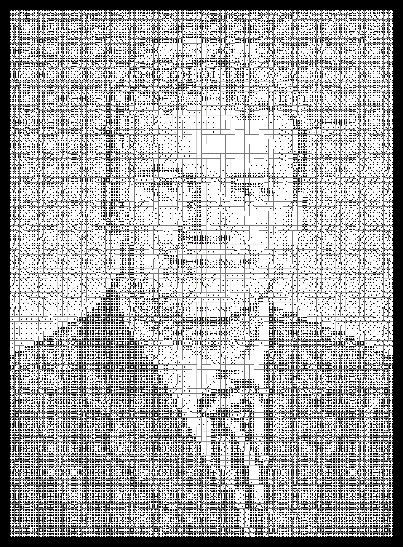
82.99 ≥ B- ≥ 80

79.99 ≥ C+ ≥ 77

76.99 ≥ C ≥ 73

72.99 ≥ C- ≥ 70

69.99 ≥ F

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*Domino Artwork via Integer Programming   
(*[*https://neos-guide.org/content/domino-art*](https://neos-guide.org/content/domino-art)*)*