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| Johns Hopkins Carey Business School |  |

**Business Analytics**

2 Credits

BU.520.601.T1

10/24/2024 - 12/19/2024  
Thursdays, 8:15AM- 11:15AM  
Fall 2

555 Penn

Room B228

**Instructor**

Evgeny Kagan

**Contact Information**

ekagan@jhu.edu

**Office Hours**

Mon 5-6pm, on Zoom

**Teaching Assistant:**

Jiaye Li, [jiayeye28@gmail.com](mailto:jiayeye28@gmail.com)

**Recommended Text (Not required)**

Stephen G. Powell and Kenneth R. Baker, *Business Analytics: The Art of Modeling with Spreadsheets*, 5th edition, John Wiley & Sons Inc. ISBN 978-1-119-29842-7.

**Course Description**

Being a business leader in a data driven world requires the knowledge of both data-related (statistical) methods and of appropriate models to leverage that data. This course focuses on the latter: it introduces students to quantitative (“analytical”) frameworks and techniques to empower decision-making and to the language for effective communication of technical concepts. The methods include optimization, risk modeling, and Monte Carlo Simulation. For each methodology, students will learn the basic mechanics, and then apply the methodology to real world business problems using software.

This course will not produce experts at modeling and/or programming (although students may be able to pick up a few spreadsheet skills along the way). Rather, the goal is to prepare managers who are comfortable translating trade-offs into models, understanding the output of the software, and who are appreciative of quantitative approaches to decision making. Emphasis will be not on programming, but rather on formulating problems, translating those formulations into useful models, and interpreting and presenting results. While many software programs are available, this course relies on MS Excel and R/Python.

**Prerequisite(s)**

BU.510.601

**Learning Objectives**

By the end of this course, students will be able to:

1. Identify and describe the trade-offs that define a problem setting.
2. Translate this understanding into a problem formulation.
3. Create a spreadsheet-based model that embodies this formulation.
4. Utilize the capabilities of Excel to develop insights about what should be done in the setting of interest.
5. Interpret the output of an analytical model and use it as a guide to improve performance.

**Attendance**   
Attendance and class participation is expected from everyone; students are expected to inform in advance if they have to miss a class due to business travel or other important matters. They are, however, responsible for submission of assignments on time as well as keeping up with the material covered in the missed lecture. Failure to inform will be treated as absence without excuse.Absence due to illness or family emergency will be handled on individual basis.

**Exam Proctoring**

The School uses RPNow to ensure the highest level of academic integrity of the exams. Please remember that as a student of the Carey Business School, you have agreed to complete your coursework with integrity.

RPNow requires a webcam and microphone. Information regarding the RPNow setup and exam conditions will be posted in your course site.

**Assignments and Exams**

The class will be divided into groups (of suitable sizes based on enrollment) for group exercises; the same groups may be used for the homework assignments.

* ***Attendance:*** Students are expected to attend all sessions. One class can be missed.
* ***Participation:*** Students are expected to engage in discussion
* ***Group project:*** In this project the group will interview a business leader, identify the analytics problem at hand and propose a solution, applying the methodologies learned in class. Group performance will be judged on the basis of the presentation of the results.
* ***Individual homework assignments:*** There will be 5 individual assignments, one related to basic excel functions, two related to optimization, one related to risk modeling and one related to simulation.
* ***Final exam:*** The last lecture will be devoted to the **final exam (duration: 3 hours)**. The exam will be open book. The exam will be a mix of **modeling (formulating problems) and** Excel exercises.

While group members may share their work, they should not discuss or share assignments with other groups. Individual assignments must be completed individually.

The grade consists of 4 components shown in the table below.

| **Assignment** | **Group or individual** | **Learning Objectives** | **Weight** |
| --- | --- | --- | --- |
| Attendance and Participation |  | 1 – 5 | 10% |
| Group project | Group | 1 – 5 | 20% |
| Homework assignments | Individual | 1 – 5 | 30% |
| Final exam | Individual | 1 – 5 | 40% |
| Total |  |  | 100% |

The group project is graded based on the following components:

- Timely submission of project proposal: 2%

- Timely submission of interview summary: 2%

- Presentation of the interview and solution in class (ppt slide deck and oral presentation): 16%

In addition, there may be penalties for absenteeism or for insufficient contribution:

1. Absenteeism: For two or more absences without excuse: 3% to 5%.
2. Late submission of any assignment: half of the grade.
3. Within-team evaluation: up to 5% deduction if an individual is reported to not have contributed to the team.

**Grading**

The grade of A is reserved for those who demonstrate extraordinary performance as determined by the instructor. The grade of A- is awarded only for excellent performance. The grades of B+ and B are awarded for good performance. The grades of B-, C+, C, and C- are awarded for adequate but substandard performance. The grades of D+, D, and D- are not awarded at the graduate level. The grade of F indicates the student’s failure to satisfactorily complete the course work. For Core/Foundation courses, the grade point average of the class should not exceed 3.35. For Elective courses, the grade point average should not exceed 3.45.

**Policy on Generative AI**

Academic integrity is a cornerstone of the Carey Business School. Generative artificial intelligence (AI) tools such as ChatGPT are widely available, and these technologies present a number of exciting opportunities in the classroom. In this course, you may use generative AI tools on homework assignments. You may not use generative AI tools for any other assignments or assessments, in particular, the final exam. Use of AI must be cited, and all professors have access to an AI indicator on “TurnItIn” which will let them know of the extent to which you likely used AI to complete an assignment. For guidance with referencing AI-generated content, please use the following:

[MLA Style Center](https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fstyle.mla.org%2Fciting-generative-ai%2F&data=05%7C01%7Cekagan%40jhu.edu%7Cf1043b0956144128851408db94f93bd4%7C9fa4f438b1e6473b803f86f8aedf0dec%7C0%7C0%7C638267570407764781%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=eWrPxFPqpQR%2BEqpX%2BLhiyHmaftSgZq7yjp%2BZx%2B28m4U%3D&reserved=0)

[The Chicago Manual of Style Online](https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.chicagomanualofstyle.org%2Fqanda%2Fdata%2Ffaq%2Ftopics%2FDocumentation%2Ffaq0422.html&data=05%7C01%7Cekagan%40jhu.edu%7Cf1043b0956144128851408db94f93bd4%7C9fa4f438b1e6473b803f86f8aedf0dec%7C0%7C0%7C638267570407764781%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=RY9GUwcJ%2Ft7sz%2BdIr%2B94F6zMEtaPnlEDbXM%2FPRcAjcc%3D&reserved=0)

[APA Style](https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fapastyle.apa.org%2Fblog%2Fhow-to-cite-chatgpt&data=05%7C01%7Cekagan%40jhu.edu%7Cf1043b0956144128851408db94f93bd4%7C9fa4f438b1e6473b803f86f8aedf0dec%7C0%7C0%7C638267570407764781%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=pvsBjcHNQ7K47dhw1tV4tXF187X6lm3oQD5puhApssw%3D&reserved=0)

**Tentative Course Calendar**

The instructor reserves the right to alter course content and/or adjust the pace to accommodate class progress. Students are responsible for keeping up with all adjustments to the course calendar.

| **Week** | **Topic** | **Selected Topics from Textbook Chapters** | **Due** |
| --- | --- | --- | --- |
| 1 | **The “zoo” of analytics/modeling:** Introduction, Models, Analytics in the news and media, Predictive vs Prescriptive Models, Basic Excel functions, Basic R capabilities | 7.1, 7.2,  Appendix 1 |  |
| 2 | **Optimization I: linear and nonlinear programming.** Nonlinear models, Excel Solver Linear equations and constraints, Linear Programming (LP); Graphical method, Staffing problems; Production planning problems, Sensitivity analysis. | 8.1-8.3, 9.1-9.5 | HW1 |
| 3 | **Optimization II: Network models.** network problems, matching/assignment problems, data-driven optimization | 10.1-10.3,  11.1-11.4 | Group project proposal;  HW2 |
| 4 | **Risk modeling I:** Decision criteria, Decision trees, Expected value | 13.1-13.3, Appendix 3 | HW3 |
| 5 | **Risk modeling II and Monte Carlo Simulation I**: Basics of random number generation, Discrete random variables, Basic simulation modeling, | 14 | Group project Interview Summary;  HW4 |
| 6 | **Monte Carlo Simulation II:** Simulationapplications in service management, healthcare, finance, entrepreneurship | 14 | HW5 |
| 7 | Group project: team presentations  Semester Review |  | Group projects (slide deck and oral presentation) |
| 8 | Final Exam |  |  |

**Note:** Some topics included in the course may not be covered in the textbook. Some topics from other chapters not listed may be covered or pointed out for additional reading.

**Carey Business School Policies and General Information**

**Blackboard Site**

A Blackboard course site is set up for this course. Each student is expected to check the site throughout the semester as Blackboard will be the primary venue for outside classroom communications between the instructors and the students. Students can access the course site at [blackboard.jhu.edu](https://blackboard.jhu.edu).

**Technical Support**

24/7 technical support for questions regarding Zoom, Blackboard, and other technical issues is available. Please refer to the *Carey Blackboard Support* information box (located within Blackboard’s *My Institution* tab) for contact information and other details.

**Students with Disabilities - Accommodations and Accessibility**

Johns Hopkins University values diversity and inclusion. We are committed to providing welcoming, equitable, and accessible educational experiences for all students. Students with disabilities (including those with psychological conditions, medical conditions and temporary disabilities) can request accommodations for this course by providing an Accommodation Letter issued by [Student Disability Services](https://carey.jhu.edu/student-experience/services-resources/student-disability-support-services). Please request accommodations for this course as early as possible to provide time for effective communication and arrangements. For further information or to start the process of requesting accommodations, please contact [Student Disability Services](mailto:carey.disability@jhu.edu) at the Carey Business School.

**Academic Ethics Policy**

Carey expects graduates to be innovative business leaders and exemplary global citizens. The Carey community believes that honesty, integrity, and community responsibility are qualities inherent in an exemplary citizen. The objective of the Academic Ethics Policy (AEP) is to create an environment of trust and respect among all members of the Carey academic community and hold Carey students accountable to the highest standards of academic integrity and excellence.

It is the responsibility of every Carey student, faculty member, and staff member to familiarize themselves with the AEP and its procedures. Failure to become acquainted with this information will not excuse any student, faculty, or staff from the responsibility to abide by the AEP. Please contact the [Office of Student Affairs](mailto:carey.student@jhu.edu) if you have any questions. For the full policy, please visit the [Academic Ethics Policy webpage](https://carey.jhu.edu/student-experience/school-policies/academic-ethics-policy).

**Student Conduct Code**

The fundamental purpose of the Johns Hopkins University’s regulation of student conduct is to promote and to protect the health, safety, welfare, property, and rights of all members of the University community as well as to promote the orderly operation of the University and to safeguard its property and facilities. Please contact the [Office of Student Affairs](mailto:carey.student@jhu.edu) if you have any questions regarding this policy. For the full policy, please visit the [Student Conduct Code webpage](https://studentaffairs.jhu.edu/policies-guidelines/student-code).

**Hybrid and Remote-Live Classes**

Carey is committed to maintaining our standard of excellence in all forms of instruction. To that end, we have developed [policies and procedures for classes offered in hybrid and remote-live formats](https://carey.jhu.edu/student-experience/school-policies/hybrid-classes-policies-and-procedures). These policies will govern all courses occurring in these formats, and all students are expected to familiarize themselves with and adhere to these policies.

**Student Success Center**

The Student Success Center offers assistance in core writing and quantitative courses. For more information, visit the [Student Success Center webpage](https://carey.jhu.edu/student-experience/academic-support/student-success-center).

**Other Important Policies and Services**

Students are encouraged to consult the [Student Handbook and Academic Catalog](https://carey.jhu.edu/student-experience/services-resources/student-handbook) and [Student Services and Resources](https://carey.jhu.edu/student-experience/services-resources) for information regarding other policies and services.

**Copyright Statement**

Unless explicitly allowed by the instructor, course materials, class discussions, and examinations are created for and expected to be used by class participants only. The recording and rebroadcasting of such material, by any means, is forbidden. Violations are subject to sanctions under the [Academic Ethics Policy](https://carey.jhu.edu/student-experience/school-policies/academic-ethics-policy).