BA in Management Program
Business Analytics Minor Program
Summer 2021
OPIM 390 – Introduction to Business Analytics

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Lecture Hours:	Tuesdays 14:40 – 16:30 Wednesdays 15:40 – 17:30 Thursdays 15:40 – 18:30 (online, synchronous)
Office Hours:	By appointment via Zoom or Google Meet
Teaching Assistant:	Reza Valimoradi (valimoradi@sabanciuniv.edu)
Recitation Hours:	Tuesdays 17:40 – 19:30
TA Hours:	By appointment via Zoom or Google Meet

Course Description:
As an introductory course to the Business Analytics Minor Program, this course will cover topics on the conceptual framework of business analytics, various sectoral application areas, and a general introduction to analytical methods used. The course will also cover success stories from different sectors, where business analytics is applied, and big data analytics in general, including its application areas, as a new and emerging area of interest.

Course Objective:
Business Analytics is the practice of using past business data and business experience in explorative, analytical and methodological ways to make better business decisions. The main objective of this course is for the student to develop an in-depth understanding of the role of business analytics and computer-based information systems in direct support of managerial decision making. Specifically, at the end of this course, students should develop knowledge and hands-on skills about:

1. Business intelligence, business analytics (descriptive, predictive, and prescriptive), data science, big data, and decision support systems
2. Real-world data, data integrations, and data preprocessing
3. Descriptive statistics, data warehousing, and visual analytics
4. Data, text and web mining methodologies and enabling technologies
5. Big data tools and technologies

Learning Outcomes:
Upon successful completion of the course, the student should be able to:

1. Define Business Analytics and its role and contributions in decision making,
2. Describe methodological approaches to business analytics and their application contexts,
3. Use descriptive, predictive and prescriptive analytics methods on business data under corresponding decision-making contexts,
4. Analyze a business case, select and apply an appropriate method to reach a business decision,
5. Understand the nature of big data and how it can be exploited to create value,
6. Use at least one leading software package or system in data analytics.

Course Material:
The course will follow the textbook: Camm, Cochran, Fry, Ohlmann, *Business Analytics*, 4th Edition, Cengage Learning, © 2021 (BA21 for short). If the book is available through Homer Bookstore as an e-book, students are expected to subscribe (not required but strongly recommended) and complete the chapter readings.

Additional list of references (optional reading):

- Witten, I. H., E. Frank, M. A. Hall and C. J. Pal (2016) *Data Mining: Practical Machine Learning Tools and Techniques* (4th Edition), Morgan Kaufmann.
- Sharda, R., D. Delen and E. Turban (2016) *Business Intelligence, Analytics, and Data Science: A Managerial Perspective* (4th Edition), Pearson.
- Bozkaya, B. and V.K. Singh (2015) *Geo-Intelligence and Visualization through Big Data Trends* (pp. 1-348). Hershey, PA: IGI Global.
- Pentland, A. (2015) *Social Physics: How Social Networks Can Make Us Smarter*. Penguin Books.
- Baesens, B. (2014) *Analytics in a Big Data World: The Essential Guide to Data Science and its Applications*.
- Mayer-Schönberger, V. and K. Cukier (2014) *Big Data: A Revolution That Will Transform How We Live, Work, and Think*. Eamon Dolan/Mariner Books.
- Dean, J. (2014) *Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners*. Wiley.
- Stubbs, E. (2014) *Big Data, Big Innovation*. Wiley.
- Davenport, T.H. and J.G. Harris (2007) *Competing on Analytics: The New Science of Winning*. Harvard Business School Press.

Additional readings may be assigned as needed over the course of the semester from the references listed above and more. The readings are chosen with the aim of stimulating class participation. Read all assigned material for a given week before coming to class.

Software:
We will use R and R Studio in this course to work on datasets and develop analytical models. Students are expected to install R and R Studio on their local PC or laptop. The instruction will be done using primarily R Studio. The course requires no pre-knowledge of the R language, but students are strongly encouraged to seek complementary resources if they have little or no programming experience. An extra session will be held to show students how to use Python, Jupyter notebooks and/or Google Colab for similar tasks.

We will also use Microsoft Excel and its Solver add-in for optimization-related problems. Make sure to have the latest version of Excel installed on your computer with the Solver add-in activated.

Students may also use other substitute software packages in their homeworks, cases and term project, after getting the consent of the instructor:

1. Python, Jupyter lab or notebooks, Google Colab
2. Tableau (eg. for data visualization)
3. Gurobi (for optimization, especially with Python)
4. Cplex & OPL Studio (for optimization)

Case Studies:
Cases are used as real-world examples of the topics. There will be four case analyses to be prepared as a team. The teams can consist of up to three students (1-student "teams" will also be allowed). The teams should work to address the issues raised in the case, clearly identify the problems to be studied, determine, and apply the necessary tools.

The following is the list of cases that will be analyzed in this offering of the course:

List of Cases

Case 1	**Due:**	**July 14, 2021**
	Case:	Heavenly Chocolates Web Site Transactions
	Type:	Chapter Case (Chapter 2)
	Subject:	Descriptive Statistics
	Teamwork?:	Yes (Team)
Case 2	**Due:**	**July 29, 2021**
	Case:	Know Thy Customer
	Type:	Chapter Case (Chapter 5)
	Subject:	Descriptive Data Mining
	Teamwork?:	Yes (Team)
Case 3	**Due:**	**August 10, 2021**
	Case:	Gray Code Corporation
	Type:	Chapter Case (Chapter 9)
	Subject:	Predictive Data Mining
	Teamwork?:	Yes (Team)
Case 4	**Due:**	**August 18, 2021**
	Case:	J.D. Williams Investment Strategy
	Type:	Chapter Case (Chapter 12)
	Subject:	Linear Optimization Models
	Teamwork?:	Yes (Team)

Course Web:
In this course, students will actively use the SUCourse+ online system. The course syllabus, lecture notes, slides and additional material will be available on SUCourse+. Students will be expected to visit the course web site at least two or three times a week. SUCourse+ will also be used for any in-class exercises, short assignments and uploading/downloading all course-related files. Students will submit all assignments via SUCourse.

Sabanci University uses a very powerful web-based tool called Turnitin. Turnitin is the worldwide standard in online plagiarism prevention. It allows instructors to compare student papers against a database composed of millions of articles. Every paper submitted by students will be scanned and cross-checked by Turnitin, and results will be reflected in students' grades.

Instructional Design:
This course is intended to be highly interactive, engaging students in active learning through hands-on exercises in addition to standard lecture material. To facilitate this process, students are expected to come to class prepared by reading the assigned material, and to actively and meaningfully participate in class discussions.

The course will be taught in the form of synchronous lectures including synchronous active learning through in-class exercises and case discussions. The Powerpoint slides shown in each lecture session will be available to the students on SUCourse+ after each session. Sessions will be recorded, and the recordings will be made available after each class with the aim of giving the

students to review the material after the lecture. Under no circumstances, the recordings may be used as an excuse not to attend a synchronous lecture.

Synchronous lectures are also interactive via in-class exercises that are carried out by the students either individually or in groups in (random) breakout rooms. Note that this portion of the lectures will not be recorded. The solutions of the in-class exercises will also be posted on SUCourse+.

Cases are used as real-world examples of the business analytics tools covered, and the students are asked to submit four case analysis reports in teams consisting of 1-3 students (same team for all four case assignments as well as the term project).

Grading:

Participation	: 10%
In-class exercises	: 20%
Case reports	: 20%
Midterm Exam	: 20%
Term Project	: 30%

Peer Evaluation in Teamwork

With the case assignments and the term project (see requirements below in the Requirements section), students will be asked to provide an evaluation of the members of their team. Each student will divide 100 points between the members of her team, including him/herself. This division should reflect that student's judgment of the contribution of the members of his/her team. The scores should not be merely functions of time spent by each member, but they should be measures of the "contribution;" their relative contribution to the idea generation, research, analysis, report writing, etc. If the team was highly functional and each member did what they committed themselves to, then the student can assign the same mark to each member of the team. If, on the other hand, some members of the team did not fulfill their commitments and did not contribute as much as the others, then points can be distributed unevenly. In cases where there are conflicting marks, it is most likely that the instructor will meet with the team members and provide a mark based on an interview. For example, in a group of three, if Students A and B believe they did most of the work, and Student C believes otherwise, the team may be called in for an interview in order to be fair to everyone.

The points submitted by all members of the team will be aggregated by the instructor. Every student will be given his/her aggregate peer evaluation, without disclosing the individual peer evaluations to the students. The peer evaluation will have a direct impact on the student's individual score. For instance, if the group score is 80 out of 100, and if the student's contribution is found to be less than expected, then the student's mark will be less than 80. There are no simple rules for adjustment.

Requirements:

Class participation:

Class participation score is awarded for regular class attendance as well as participating in the class discussions in a meaningful way (eg. asking relevant questions, making comments intellectually contributing to the discussion). Points can be taken off for arriving the session late or not attending at all. Reading the material to be covered and working out any problems that are suggested will prepare you for each class session.

In-Class exercises:
In-class exercises are to be completed during the lecture and submitted at the end of the session. They may be individual or group exercises. In some cases, an exercise may not be finished by the end of the session and the submission can be made at a later time to be announced by your instructor. Students who do not attend the session will not receive marks from such exercises. In the case of technical difficulties preventing the expected presence, students should inform the instructor immediately to find a solution.

Case Analysis:
There will be four case assignments to be prepared as a team consisting of 1-3 students. Once the teams are formed, students can change their teams for a valid reason only with the approval of the instructor. Each case submission must show the names of all team members.

The teams should address the issues raised in the case, clearly identify the problems to be studied, determine, and apply the necessary business analytics tools. A case report will be prepared for each case explaining the decision-making problem at hand and the approach taken by the team to address the situation, presenting their analysis and recommendations. Each team should submit their report on SUCourse+ as a PDF file along with supplementary attachments (R code, Excel file, etc.). Multiple submissions can be made until the submission deadline. Late submissions, up to 48 hours past the deadline, will have penalty applied, 25% per each day late (after the first 10 minutes past the deadline). There will be no deadline extension for any assignment.

Midterm:
There will be only one midterm in approximately middle of the semester. Additional details on the midterm will be posted as an announcement on SUCourse+. Students are expected to follow these announcements on SUCourse+. There will be no makeup for the midterm. If you miss the midterm in the case of plausible excused absences (for health reasons, etc.), please get in touch with your instructor at your earliest convenience.

Term Project:
The Term Project will be assigned before the half of the semester is reached. The project can be done in teams of no more than 3 students. The project will be about a real business case with real data where students will be expected to apply the concepts and techniques learned in class to data-driven decision making. The teams will only be asked to turn in a final report by the end of final exam period. The final report of the term project must show the names of all team members. The teams should submit their final report also through SUCourse+ as a PDF file along with supplementary attachments (R code, Excel file, etc.).

Note: If you miss a particular assignment (including class attendance) due to sickness, accident, etc., you must bring in an official doctor's report describing the situation before you can request a make-up for the missed grade. Only medical reasons will be accepted for make-up purposes.

Academic Honesty:
Learning is enhanced through cooperation and as such you are encouraged to work in groups, ask for and give help freely in all appropriate settings. At the same time, as a matter of personal integrity, you should only represent your own work as yours. Any work that is submitted to be evaluated in this class should be an original piece of writing, presenting your ideas in your own words. Everything you borrow from books, articles, or web sites (including those in the syllabus) should be properly cited. Although you are encouraged to discuss your ideas with others (including your friends in the class), it is important that you do not share your writing (slides, MS Excel files, reports, etc.) with anyone. Using ideas, text and other intellectual property developed by someone else while claiming it is your original work is *plagiarism*. Copying from others or

providing answers or information, written or oral, to others is *cheating*. Unauthorized help from another person or having someone else write one's paper or assignment is *collusion*. Cheating, plagiarism and collusion are serious offenses that could result in an F grade and disciplinary action. Please pay utmost attention to avoid such accusations.

Specific to this course, it is important to know that submitting a computer file (e.g., Excel workbook or R code) prepared by someone else, even partially, is cheating. You may talk to others about assignments, but in the end, you should be doing all the work. It is important that you do not share your solutions as Excel or R code files with anyone until it has been graded. Sharing your file with others could easily tempt them to submit part or all of it as their own. This would be considered cheating and, in most cases, is very easy to detect. Once you share your file with someone, it could easily be forwarded to a lot of students some of whom could cheat or plagiarize. Plagiarism is a very serious misdeed that can result in a reduced grade or an F (for the assignment and/or the course).

Classroom policies and conduct

Sabancı BA in Management Program **values participatory learning**. Establishing the necessary social order for a **participatory learning environment requires that we all**:

- Start each class session on time. This involves coming to each class on time.
- Turn off all cell phones, tablets, laptops or other electronic devices unless they are used as part of the lecture. Mute yourself in each session except when you are talking.
- Do not leave and re-enter the class during each online session (except when technical problems arise).
- Come prepared to make helpful comments and ask questions that facilitate your own understanding and that of your classmates. This requires that you complete the assigned readings for each session before class starts.

Tentative Course Schedule:

Week 1a	**Date:**	**Thursday, July 1, 2021 (3 hours)**
	Topics:	*Course Introduction*
		Introduction to Business Analytics
	Requirements:	Reading – Chapter 1 in BA21
		Reading – Article on Business Analytics
Week 1b	**Date:**	**Tuesday, July 6, 2021 (2 hours)**
	Topic:	*Class postponed due to technical difficulties*
		1 hour make-up is added to class 3b (July 27)
		1 hour make-up is added to class 4c (August 4)
	Requirements:	☺
Week 1c	**Date:**	**Wednesday, July 7, 2021 (2 hours)**
	Topic:	*Introduction to Business Analytics (continued)*
		Discussion on readings
		Descriptive Statistics
	Requirements:	Reading – Chapter 2 in BA21
		Assigned – Chapter Case: Heavenly Chocolates Website Traffic
Week 2a	**Date:**	**Thursday, July 8, 2021 (3 hours)**
	Topic:	*Descriptive Statistics (continued)*
	Requirements:	☺
		Due – Install R and R Studio
Week 2b	**Date:**	**Tuesday, July 13, 2021 (2 hours)**
	Topic:	*Data Visualization*
	Requirements:	Reading – Chapter 3 in BA21

Week 2c	**Date:**	**Wednesday, July 14, 2021 (2 hours)**
	Topics:	*Case Discussion* *Data Visualization (continued)* *Introduction to R and R Studio*
	Requirements:	Due – Chapter Case: Heavenly Chocolates Website Traffic Assigned – Term Project
Week 3a	**Date:**	**Thursday, July 15, 2021 (3 hours)**
	Topics:	*Class postponed due to National Holiday.* *Make-up class will be on August 19, 2021*
	Requirements:	☺
		Week of July 19-23 – HOLIDAY BREAK
Week 3b	**Date:**	**Tuesday, July 27, 2021 (3 hours) – INCLUDING 1HR MAKEUP**
	Topics:	*Introduction to R and R Studio (continued)* *Descriptive Data Mining*
	Requirements:	Reading – Chapter 5 in BA21 Assigned – Chapter Case: Know Thy Customer
Week 3c	**Date:**	**Wednesday, July 28, 2021 (2 hours)**
	Topics:	*Descriptive Data Mining (continued)* *Linear Regression*
	Requirements:	Reading – Chapter 7 in BA21
Week 4a	**Date:**	**Thursday, July 29, 2021 (3 hours)**
	Topics:	*Case Discussion* *Linear Regression (continued)* *Time Series Analysis and Forecasting*
	Requirements:	Reading – Chapter 8 in BA21 Due – Chapter Case: Know Thy Customer
Week 4b	**Date:**	**Tuesday, August 3, 2021 (2 hours)**
	Topics:	*Midterm Exam*
	Requirements:	Textbook, notes, calculator
Week 4c	**Date:**	**Wednesday, August 4, 2021 (3 hours) – INCLUDING 1HR MAKEUP**
	Topics:	*Time Series Analysis and Forecasting (cont'd)* *Predictive Data Mining*
	Requirements:	Reading – Chapter 9 in BA21 Assigned – Chapter Case: Gray Code Corporation
Week 5a	**Date:**	**Thursday, August 5, 2021 (3 hours)**
	Topics:	*Predictive Data Mining (cont'd)*
	Requirements:	☺
Week 5b	**Date:**	**Tuesday, August 10, 2021 (2 hours)**
	Topics:	*Case Discussion* *Monte Carlo Simulation*
	Requirements:	Reading – Chapter 11 in BA21 Due – Chapter Case: Gray Code Corporation
Week 5c	**Date:**	**Wednesday, August 11, 2021 (2 hours)**
	Topics:	*Linear Optimization Models*
	Requirements:	Reading – Chapter 12 in BA21 Assigned – Chapter Case: J.D. Williams Investment Strategy
Week 6a	**Date:**	**Thursday, August 12, 2021 (3 hours)**
	Topics:	*Linear Optimization Models (continued)* *Integer Linear Optimization Models*
		Reading – Chapter 13 in BA21

Week 6b	**Date:**	**Tuesday, August 17, 2021 (2 hours)**
	Topics:	*Integer Linear Optimization Models (continued)*
	Requirements:	☺
Week 6c	**Date:**	**Wednesday, August 18, 2021 (2 hours)**
	Topics:	*Case Discussion* *Decision Analysis*
	Requirements:	Reading – Chapter 15 in BA21 Due – Chapter Case: J.D. Williams Investment Strategy
Week 7a	**Date:**	**Thursday, August 19, 2021 (3 hours)**
	Topics:	*Decision Analysis (cont'd)* *Course Wrap-up*
	Requirements:	☺
Week 7	**Date:**	**Monday, August 23, 2021**
	Requirements:	Due – Term Project Final Report Due – Team Peer Evaluation