

**BA in Management Program
Business Analytics Minor Program
Fall 2021**

OPIM 390 – Introduction to Business Analytics

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Type	Time	Days	Where
Class	10:40-12:30	Thursdays	In-class (FENS G032) & Online (Zoom [*])
	12:40-13:30	Fridays	In-class (FENS G032) & Online (Zoom [*])
Recitation	13:40-14:30	Fridays	Online (Zoom [*])

Zoom^{*} The zoom link will be posted as a SUCourse announcement at the beginning of week 1.

Students who are not registered to OPIM 390 and will try to get the course during the add-drop period should send an email to the instructor to get access to SUCourse during week 1.

Course Description:

OPIM 390 is a required course for the Business Analytics Minor Program and an area elective course for the BA in Management program. 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 Objectives:

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 a leading at least one software package in data analytics.

Course Material:

Textbook:

We will be closely following the textbook given below. You are expected to read the chapters mentioned in the course outline before each session.

Jeffrey D. Camm; James J. Cochran; Michael J. Fry; Jeffrey W. Ohlmann, Business Analytics, 4th Edition, Cengage Learning, © 2021 (BA21 for short).

Software:

We will primarily use Excel and R & RStudio for business analytics in this course. However, the students can use the following software packages in their term projects *after getting the consent* of the instructor: Tableau (for especially data visualization), Gurobi (for optimization, especially with Python), Cplex & OPL Studio (for optimization) and Python

Optional Software:

KNIME (a free open source analytics platform – knime.org), SAS Visual Analytics, RapidMiner (a free open source analytics tool – rapidminer.com), Orange (a free open source analytics platform – orange.biolab.si), IBM SPSS Modeler with Text Analytics, Simio, Weka, Arena.

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 (teams comprised of one student 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 details on the case studies are provided below:

Case 1	Due: Week 4
Case (Type):	To Be Announced (HBS or Textbook)
Subject:	Exploratory Data Analysis (EDA) (Ch. 2-3 and reviewed Ch. 6)
Teamwork? (Grading):	Yes (Team)
Case 2	Due: Week 6
Case (Type):	To Be Announced (HBS or Textbook)
Subject:	Descriptive Data Mining (Ch. 5)
Teamwork? (Grading):	Yes (Team)
Case 3	Due: Week 10
Case (Type):	To Be Announced (HBS or Textbook)
Subject:	Predictive Data Mining (Ch. 9)
Teamwork? (Grading):	Yes (Team)
Case 4	Due: Week 12
Case (Type):	To Be Announced (HBS or Textbook)
Subject:	Spreadsheet Models and/or Monte-Carlo Simulation (Ch 10-11)
Teamwork? (Grading):	Yes (Team)

Reading Assignments:

Some additional articles and cases might be announced and used as real-world examples of the topics covered in class.

Optional Reading Materials:

Several online resources for learning the R software will be posted on SUCourse. Each student should check these resources and find the one that works best for his/her learning.

Additional list of references:

- 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.
- Baesens, B. (2014) *Analytics in a Big Data World: The Essential Guide to Data Science and its Applications*, John Wiley & Sons.
- 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*, John Wiley & Sons.
- Stubbs, E. (2014) *Big Data, Big Innovation*, John Wiley & Sons.
- Davenport, T. H. and J. G. Harris (2007) *Competing on Analytics: The New Science of Winning*. Harvard Business School Press.
- 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.

Course Web:

The course syllabus, announcements, (pre-lecture and post-lecture) notes, post-lecture recordings, some in-class exercises and their solutions, and your grades will be posted on SUCourse. Students are expected to visit SUCourse a couple of times each week.

The pre-lecture and after-lecture notes will be posted on SUCourse which will be organized on a week and chapter basis so that students can follow the course schedule posted at the end of this syllabus. The pre-lecture slides include majority of the slides and are posted before the lectures so that students can print them or download them to take they can take notes during the lectures.

The Announcements component of SUCourse will be actively used for sharing announcements. Each announcement posted on SUCourse will be emailed to the students, thus the students are responsible for regularly checking their emails and appropriately setting the emailing options in their SUCourse account. Note that due to the national holidays and the last day of the lectures announced in SU Academic Calendar, we have 12.5 weeks instead of 14 weeks. Hence, for some of the qualitative chapters the recitation hours might be actively used for coverage of some course topics.

The in-class exercises are to be downloaded and uploaded via the Assignments component. Similarly, the case analysis reports, the term project presentations and final reports are to be uploaded under the designated assignment.

For the individual assessments, cases, and term project, the Turnitin tool will be used. 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 you submit for the midterm, case analysis reports, and term project will be scanned by Turnitin, and results will be reflected in your grades.

Instructional Design:

The course will be taught using a blend of in-class and online synchronous lectures and online synchronous recitations, which are integral part of the course. The course is designed to facilitate active learning of the topics and hands-on learning of the software (Excel and R) through in-class exercises, various individual assessments such as quizzes, midterm, and reflection papers. There will be four case analysis reports, and a term project (to be prepared in teams of 1-4 students) and aim to facilitate development of essential skills demanded in the field of business analytics,

The pre-lecture notes will be posted on SUCourse in the main page which will be organized according to the week number and chapter name to match the schedule posted at the end of this schedule. The post-lecture slides prepared for each chapter will be available to the students at the SUCourse site after each chapter is completely covered in the lectures. The links of the recorded in-class synchronous lectures will be provided on SUCourse after each class. These recordings aim to give the students the opportunity to review the material and learn at their own pace. Note that during the on-hand learning part of the lectures and recitations, where students are required to complete the given tasks with the given software, recordings are unfortunately not possible.

In-class and online synchronous lectures are also interactive via in-class exercises that are carried out by the students either individually or in groups. The students who are in-class might be required to connect to zoom for the in-class exercises. These assignments involve the use of advanced statistics, spreadsheet modeling, and coding in order to perform the corresponding business analytics tasks.

Some of the in-class exercises done in the lectures or recitations might be pop-quizzes which are included in your individual assessment grade. There are currently two individual assessments that are already posted on the schedule (see the last page of this syllabus). Further details regarding the nature of each individual assessment will be posted on SUCourse,

Cases and the term project are used as real-world examples of the business analytics tools covered. The students are asked to submit four case analysis reports in teams consisting of 1-4 students. Similarly, the term project involves a final report and a presentation and can be done in teams of 1-4 students. The case teams and term project teams can be different, and this decision is at the discretion of each team.

Grading:

Attendance and Participation:	10%
In-Class Exercises:	20%
Case Analysis Reports:	20%
Individual Assessments (Midterm, Quizzes, Reflection Papers, etc.):	25%
Term Project (Presentation and Report):	25%

Peer Evaluation in Teamwork

Students will be asked to provide an evaluation of the members of their team in the cases analysis. Each student will divide 100 points between the members of her team, including him/herself. This division should reflect that person's judgment of the contribution of the members of 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, writing, oral presentation, 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.

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.

In case there is no consensus among the team, for example, if three students divide the marks evenly and the fourth one divides them unevenly, then the instructor will use his/her judgment to assign peer evaluation marks--possibly after meeting with the members of the team.

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 four, if Students A and B believe they did most of the work, and Students C and D believe otherwise, the team may be called in for an interview in order to be fair to everyone.

Past experience indicates that in most groups points will be distributed evenly. There will be a few groups where peer evaluations will play a role in the marks. The primary goal of this exercise is to avoid giving undeserved credit to individuals who did not help their teams. However, it is possible to have upwards adjustments of marks in case of students who have done more than what the group expected of them.

The peer evaluation will have a direct impact on your case analysis grades. To give a simple example, if the group mark is 20 out of 25, and if your peer evaluation indicates that your contribution was less than what was expected, then your case analysis grade mark will be less than 20 out of 25. There are no simple rules for adjustment.

Requirements:

Attendance & Participation

Class attendance includes being in the class (physically or through zoom) **on-time in each session, hence, we have a poll for acknowledging your presence at the beginning of each session.** It also includes **getting involved in the learning process** during class hours without distracting yourself or your classmates by various non-class related activities.

Class participation includes getting involved in the learning process during class hours either physically or online. **The non-verbal participation** requires being promptly in class and engagement via complying with classroom policies and conduct (see page 8 of this syllabus). Points can be taken off for not complying with the classroom policies and conduct. **The verbal participation** involves contributing to class discussions positively and regularly and asking questions which cannot be possible without due preparation (hence quality, relevance, frequency, and timing will be accounted for). Reading the material to be covered and working out any problems that are suggested will prepare you for each class session. Hence, last year we have actively used zoom polls and chat to enable active participation of our students.

In-Class Exercises

In-class exercises will be assigned during class hours. They may be group or individual exercises. These will be completed during class and submitted at the end of the class hour. Still, very few of them might be started in-class and submitted afterward at times to be announced by your instructor. You are expected to work on the assigned exercises by communicating with your classmates and the instructor (through the Zoom Breakout Rooms if required). Although these in-class exercises will be graded, majority of them are not quizzes but means to learn the topics actively during physical and online synchronous class hours. Students who are not present physically or on zoom will not receive grades from such exercises. In the case of glitches preventing the expected presence, students should send a short email and inform the instructor immediately to find a solution.

Some of the in-class exercises might be pop-quizzes that are to be included in your individual assessment grade.

Individual Assessments

There will be a number of individual assessments in the form of pop-quizzes, midterm and reflection papers. The individual assessments are not equal weight and the weights will be posted throughout the semester as they are announced/conducted. Currently two individual assessments are posted on the course schedule (see the last page of the syllabus).

The details of the individual assessments (other than the pop-quizzes) will be posted on SUCourse. The individual assessment in the form of a midterm will comply the rules announced by Sabanci University. The current instructions we have received requires it to be an in-class exam and a suggested duration of 90 minutes. In case the midterm is longer than 90 minutes it is required to be organized in two sessions separated with a break. Hence, the midterm can have a closed book (closed laptop) section consisting of multiple choice, true/false questions in addition to short answer questions where you might be required to do certain analysis or interpret some given results. In the second part of the midterm, we might have an open book section where you open your laptops and answer the questions by using the use of the required software (R and Excel).

If you have missed or will miss any individual assessment and you have an approved health report, please get in touch with your instructor immediately to formulate a proper makeup for the missed individual assessment.

Case Analysis

There will be four case assignments to be prepared as a team consisting of 1-4 students (see page 2). Students are free to form/change their teams in each case. Each case 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 only once as a PDF file. For the sake of completeness, teams can additionally email their Excel or R Studio files to the instructor.

Term Project

The Term Project will be assigned towards the end of the semester. The project can be done in teams of no more than 4 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 term project involves a presentation and a final report.

The teams will be expected to **present their term project** in week 14. The PowerPoint slides need to be posted through the designated SUCourse Assignment. The presentation is expected to be 10 minutes long and summarize the term project. If the number of project teams is too high so that they do not fit in the 100 minutes long class session, the teams will be requested to record their presentations via zoom. While you are presenting the slides, the speaker's camera should be open and included in the recording. Once the presentation is recorded, the file or the file link (google drive or youtube) is to be sent to the instructor. It is at the discretion of the project team to decide how many students or who will present.

The **final report of the term project** is due to the first week of university-wide final exams. The final report of the term project must show the names of all team members. The teams should submit their final report through SUCourse only once as a PDF file. For the sake of completeness, teams can additionally email their Excel, R Studio or any other source files to the instructor. Project teams who want to use other software than Excel or R, should get in touch with the instructor and get consent.

Late Submission Policy

Late submissions will not be allowed for the in-class exercises and individual assessments. However, for the case analysis reports, term project presentations and term project reports only one-day lateness might be allowed with a lateness penalty of 10-20%, which is at the full discretion of the instructor.

Interviews

As part of the assessment of all course requirements, the faculty member may invite a student or a team for an online interview to go through the solutions and underlying the case report, project report R files and/or Excel files. Considering the guidelines provided to the faculty members by Sabanci University, it is at the full discretion of the faculty member to make these interviews or not. The guidelines provided for the interview require the online interview to be recorded. It is worthwhile to note that students should not feel stressed due to the possibility of the conduct of the interviews as they will be done only on a need basis. Students are expected to check their emails regularly and positively respond to the interview email invitation in a timely manner (within one-two business days is acceptable).

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.

Specific to this course, it is important to know that submitting a computer file (e.g. Excel workbook or RStudio file) 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 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 cheating and, in most cases, easy to detect. Once you share your file with someone, it could easily be forwarded to a lot of students and 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). *Please pay utmost attention to avoid such accusation.*

Classroom Policies and Conduct

Sabancı BA in Management Program and Business Analytics Minor Program **value participatory learning**. Establishing the necessary social order for **a participatory learning environment requires that we all:**

- Start each fifty-minute class session on time. This involves coming to each class physically or online on time.
- Turn off all cell phones, tablets, laptops or other electronic devices unless they are used as part of the lecture.
- Do not leave and re-enter the class during each fifty-minute long lecture (of course glitch related exceptions are granted for online students and students in class can silently get the consent of the instructor by showing their eyes for a folded lens emergency and the like).
- 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 the class starts.

Due to the Covid-19 pandemic, the students physically coming to the class have to fully comply with all the rules announced to the students by Sabancı University Covid Education Committee. Please make sure you comply with the rules associated with the following titles that will be shared with you by Sabancı University Administration during the first two weeks of the semester:

- **Social Distancing and Masks:** Both the instructor and the students must wear masks properly throughout the lecture, lab, studio hours. **There will be no exception to this regulation indoors and in the classrooms.** Moreover, seating arrangements have been made to ensure proper social distancing.
- **Classrooms and Seating Arrangements: Social distancing will be observed** in every hybrid or only-physical lecture. Follow the posted seating arrangements and get seated accordingly.
- **Rotation for In-person Attendance:** Due to limited seating capacity of classrooms, a certain rotation must be implemented, especially early in the semester. There will be a general announcement to all students for the first two weeks. Please read that announcement.
- **Office Hours:** All office hours are strongly advised to be held online via Zoom this semester. Designated office hours will be announced on SUCourse. If they do not work for you send an email (at least one-two days before) to arrange an office hour.

Tentative Course Schedule:

Week 1	Dates: September 30-October 01, 2021 Topic: Introduction Requirements: Read Chapter 1 and install Excel (English is recommended), R and RStudio.
Week 2	Dates: October 07-08, 2021 Topic: Descriptive Statistics and Statistical Inference (as a review only) Requirements: Read Chapter 2 and Chapter 6 (focus on Section 6.5). Individual Assessment 1: Details will be posted on SUCourse at the end of Week 1.
Week 3	Dates: October 14-15, 2021 Topic: Data Visualization Requirements: Read Chapter 3. Start Case 1 (see page 2 for details).
Week 4	Dates: October 21-22, 2021 Topic: Descriptive Data Mining Requirements: Read Chapter 5. Case 1 Due: Submission of the case analysis report on SUCourse.
Week 5	Dates: October 28-29, 2021 Topic: No Class – National Holiday Requirements: Start Case 2 (see page 2 for details).
Week 6	Dates: November 04-05, 2021 Topic: Time Series and Forecasting Requirements: Read Chapter 8. Case 2 Due: Submission of the case analysis report on SUCourse.
Week 7	Dates: November 11-12, 2021 Topic: Linear Regression Requirements: Read Chapter 7.
Week 8	Dates: November 18-19, 2021 Topic: Predictive Data Mining Requirements: Read Chapter 9. Individual Assessment 2: Details will be posted on SUCourse at the end of Week 6.
Week 9	Dates: November 25-26, 2021 Topic: Predictive Data Mining (Continued) Requirements: Read Chapter 9. Start Case 3 (see page 2 for details).
Week 10	Dates: December 02-03, 2021 Topic: Spreadsheet Models Requirements: Read Chapter 10. Case 3 Due: Submission of the case analysis report on SUCourse.
Week 11	Dates: December 09-10, 2021 Topic: Monte Carlo Simulation Requirements: Read Chapter 11. Start Case 4 (see page 2 for details).
Week 12	Dates: December 16-17, 2021 Topic: Linear Optimization Models Requirements: Read Chapter 12. Case 4 Due: Submission of the case analysis report on SUCourse.
Week 13	Dates: December 23-24, 2021 Topic: Integer Optimization Models Requirements: Read Chapter 13. Work on your term project.
Week 14	Dates: December 30, 2021 Term Project Presentation: Presenting your term project. Details will be posted on SUCourse in Week 13 Submission: Submission of presentation file on SUCourse.
	Final Exam Week 1: Specific date to be announced (planned date is January 09, 2022 Sunday 18:00) Term Project Report: Submission of the final report of the term project through SUCourse.