Course prescription
Based on a real-life project and focuses on bringing a competitive advantage through improving the overall decision-making process of the company hosting the project: from data to information, from information to knowledge, from knowledge to decisions. By dealing with a wide range of challenges surrounding real-life decision-making students will not only solidify what they learned in the core courses into a coherent system of business analytics but will also develop skills of finding practical solutions and proving their financial impact on the company’s bottom line.

Course advice
Prerequisite: INFOMGMT 290, 292 or INFOSYS 222 or equivalent.

Advice:
Any capstone course is designed, and will be most helpful, for students completing their major. In other words, before taking this course, students are expected to have skills taught in “Data Visualization” and “Data Wrangling” courses (INFOMGMT 392 & 390), and, if not already completed then should be concurrently enrolled into “Data Mining and Decision Support” (INFOMGMT 393).

No knowledge of specific programming languages such as R or Python is assumed or required. However, students should be aware that the assessment of certain common business metrics (for example, Return on Investment) using the built-in functions of Tableau (or Power BI) may prove more laborious than with R or Python. Students familiar with R or Python are welcome to use them as much as they want.

Goals of the course
In today’s business landscape, when competing companies have access to similar resources and technologies, it is the quality of decision-making that often becomes the only source of competitive edge. It is not a coincidence that when celebrated companies unveil the main secrets of their success evidence-based management (or data-driven decision-making) is always among them.

The course aims to help students improve the Business Analytics skills needed for supporting evidence-based management in a company:
a) The ability to conduct all stages of a business analytics process (descriptive, predictive, prescriptive), with a particular focus on the connectivity of all stages and credibility of the analysis.

b) The ability to work in a team with other Business Analysts: identification of tasks required at each stage, effective allocation of tasks among the team members, scheduling of the tasks, plan execution and timely use of the risk-mitigation actions.

c) The ability to communicate with and work in collaboration with functions supporting Business Analytics such as Data Analytics, Data Engineering, Data Science, IT.

d) The ability to communicate the data insights to key stakeholders across the company by different means such as printed reports, interactive dashboards (Tableau, Power BI), “walkthrough” videos and short presentations.

It is worth noting that while proficiency with the discipline-specific tools and mastery of the domain knowledge is crucial for qualifying as a Business Analytics professional, the higher-level goal of the course is the improvement of the most fundamental and transferrable to any other domain skills such as critical thinking, solution-seeking and communication.

### Learning outcomes (LO)

<table>
<thead>
<tr>
<th>#</th>
<th>Learning outcome</th>
<th>Graduate profile capability*</th>
</tr>
</thead>
</table>
| LO1| Appreciation for all stages in the business analytics process, its connectivity and verifiability as prerequisites for credibility, and required tools. | 1. Disciplinary knowledge and practice  
2. Critical thinking  
3. Solution seeking  
4a. Communication (Oral)  
6a. Social responsibilities |
| LO2| Ability to identify and make use of the analytics-supporting resources on the Internet. | 1. Disciplinary knowledge and practice  
2. Critical thinking  
3. Solution seeking  
5a. Independence |
| LO3| Main principles/prerequisites of successful teamwork: respect to others and responsibility, humbleness and patience in explaining others their mistakes | 5a. Independence  
4c. Engagement  
4a. Communication (Oral)  
4b. Communication (Written)  
5b. Integrity |
| LO4| Ability to communicate results both within an analytics team and to outside audience | 4a. Communication (Oral)  
4b. Communication (Written)  
1. Disciplinary knowledge and practice |

* See the graduate profile this course belongs to at the end of this course outline.
<table>
<thead>
<tr>
<th>Week / Module</th>
<th>Topics / main activities</th>
<th>Assessment due this period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to the course. Overview of the tools used in the course, access credentials. The dataset. Git.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Git (continued). ETL / Basic exploratory analysis.</td>
<td>Group work plan</td>
</tr>
<tr>
<td>3</td>
<td>Video presentations of the accomplished tasks and learning from them.</td>
<td>1. Exploratory analysis: import the raw data to the database, make sure it imported correctly, identify the main tables and relationships between, produce relevant visualizations. 2. Assessment of other teams’ presentations. 3. Within-team peer assessment.</td>
</tr>
<tr>
<td>4</td>
<td>Identification of the relevant KPIs: case study discussion.</td>
<td>Group work plan</td>
</tr>
<tr>
<td>5</td>
<td>Video presentations of the accomplished tasks and learning from them.</td>
<td>1. Business Performance analysis (KPI needed for prescriptive analytics) 2. Assessment of other teams’ presentations. 3. Within-team peer assessment.</td>
</tr>
<tr>
<td>6</td>
<td>Revising the previous work and working on the next deliverable.</td>
<td>Group work plan</td>
</tr>
<tr>
<td>7</td>
<td>Video presentations of the accomplished tasks and learning from them.</td>
<td>1. Explanatory analysis (predictive analytics) 2. Assessment of other teams’ presentations. 3. Within-team peer assessment.</td>
</tr>
<tr>
<td>8</td>
<td>Revising the previous work and working on the next deliverable.</td>
<td>Group work plan</td>
</tr>
<tr>
<td>9</td>
<td>Video presentations of the accomplished tasks</td>
<td>1. Prescriptive analytics / proof-of-value. 2. Assessment of other teams’ presentations. 3. Within-team peer assessment.</td>
</tr>
<tr>
<td>10</td>
<td>Revising the previous work and working on the next deliverable.</td>
<td>Group work plan</td>
</tr>
<tr>
<td>11</td>
<td>Video presentations of the accomplished tasks and learning from them.</td>
<td>1. Final version of the decision-support dashboard. 2. Assessment of other teams’ presentations. 3. Within-team peer assessment.</td>
</tr>
<tr>
<td>12</td>
<td>Course wrap-up</td>
<td>Project report</td>
</tr>
</tbody>
</table>

1 The allocation of topics to weeks is subject to changes, depending on availability of guest lecturers, etc..
Learning and teaching

The approach
As a whole, this capstone course simulates the environment typical for small analytics projects undertaken by analytics teams in organizations. This approach has a number of implications.

One is that the course deliverables have been evenly spread throughout the semester. Just like the typical business requirements translate to requirements for employees to come to work regularly, at 9:00 am every working day, the structure of this course assignments requires students to work on them every week.

A peculiar and absolutely crucial role of the teaching team in this course (apart from the usual assessor functions), is to be the “IT” or “BI” support. The reason is that certain types of data transformations / analysis may prove prohibitively time-consuming even with using powerful data transformation tools such as Tableau Prep. In such cases, Business Analysts must seek help from the “IT” or “Data Science” staff, and the ability to communicate the requirements to more technically-minded people (“computer geeks”) is extremely important. Our “IT support” will try to relieve you of tasks that require knowledge beyond our Business Analytics program.

The process
In terms of workflow, the process approximately follows an agile framework with 2-week sprints. Students will learn the technical material and master the tools while working on milestone deliverables, from deliverables produced by other teams, and from the instructor’s feedback on deliverables. Lectures or written instructions introducing tools, explaining certain technical material or suggesting the use of certain solutions for upcoming deliverables will be provided on an “as needed” basis, at the instructor discretion.

In a nutshell, every two weeks students submit a 10-15 min video recording of their presentation (voice over slides and/or walkthrough of the code) explaining what the team achieved. The reason for video-recording the presentations is two-fold: to remove a possibility that the teams presenting later may take advantage of the ideas they saw in the earlier presentations, and to help teams focus on learning from other presentations. After presentations, teams reflect on their own and the work of others, and submit a peer-assessment. The final deliverable will be a complete package containing all the artefacts created by the team.

Workload
The breakdown of workload should be approximately the following:

- 36 contact hours
- 20 hours working on presentations and their assessments
- 84 hours of self-study/analysis/solution development

Overall, 140 hours (the university guidelines/policies set a limit of 150)

Recommended work plan for every "milestone"

The course is expected to be demanding. To keep the workload within 150 hours throughout the semester students will need to master team work.
1. Each team member should spend 1 hour working individually, in complete isolation from the rest of the team, developing a “plan of attack”, outlining the steps required to achieve the next goal, the tools required at each step and the amount of time each step requires. This part is absolutely critical as it reduces the risks of a team failure due to groupthink.

2. After each team member develops their plan independently, the team meets for 2-3 hours to compare the plans, reflect on the parts that each of the plans was missing (or underestimating), and develop a working plan for the team splitting the workload.

3. Each team member should spread working on their own part over at least three days (~3 hours a day).

4. Three to five days before the next milestone due date the team meets for 1-2 hours to reflect on how much of the planned work has been completed as desired, and possibly to reallocate the remaining work in order to finish it in 1-2 days.

5. Three days before the deadline all required analysis should be complete and the team should proceed to recording of the presentation.

Teaching staff
Dr Valery Pavlov, the course instructor, v.pavlov@auckland.ac.nz
Mr Koro Tawa, the course Information Technology consultant, k.tawa@auckland.ac.nz

Learning resources

Software
Servers (accessible only within the university network)

- SAP HANA stack (database + application + web servers):
  http://comsaphana.its.auckland.ac.nz:8090/ (access instructions TBA)
- Power BI Report Server: (access instructions TBA)

Clients (available in OGGB computer labs)

- Power BI Desktop (free, can be downloaded from https://powerbi.microsoft.com/en-us/desktop/)
- Tableau Desktop
- Tableau Prep

Development tools (available in OGGB computer labs)

- RStudio/R (free, can be downloaded from www.rstudio.com)

References and tutorials
There are too many sources of information on the Internet on any of the tools used in the course to make a list. They can be easily found using the Internet search engines. The few provided below are only suggested as possible starting points:


https://docs.microsoft.com/en-us/power-bi/desktop-getting-started

Information on Canvas

- This course outline
- The course pack
- Recordings of the presentation sessions
- Recordings of the lectures
- Summary of the key learning points (from the feedback and reflections of students and teaching staff) for every deliverable
- Grades and comments in the gradebook
- Q/A on Piazza. Post your questions and either the teaching staff or other students will answer.

Nothing else specific is planned to be posted on Canvas but can be. For example, if we have a guest speaker, his/her slides may be uploaded.

(continued on the next page)

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2 Nothing based on or referencing the data set can be uploaded on Canvas due to data security requirements.
3 Guest lectures will not be recorded as guests’ presentations may contain sensitive information about their employers.
Assessment information

<table>
<thead>
<tr>
<th>Assessment task</th>
<th>Weight %</th>
<th>Group and/or Individual</th>
<th>Submission (via Canvas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive: ETL and Exploratory analysis of the data set (any tools allowed)</td>
<td>10%</td>
<td>Group and Individual</td>
<td>Video recording of the presentation</td>
</tr>
<tr>
<td>Descriptive: Business performance analysis (any tools allowed, R can be a critical enabler)</td>
<td>10%</td>
<td>Group and Individual</td>
<td>Video recording of the presentation</td>
</tr>
<tr>
<td>Predictive: Explanatory analysis (using R)</td>
<td>10%</td>
<td>Group and Individual</td>
<td>Video recording of the presentation</td>
</tr>
<tr>
<td>Decision-support module (Power BI and R)</td>
<td>10%</td>
<td>Group and Individual</td>
<td>Video recording of the presentation</td>
</tr>
<tr>
<td>Proof-of-value (using R)</td>
<td>10%</td>
<td>Group and Individual</td>
<td>Video recording of the presentation</td>
</tr>
<tr>
<td>Group work plans</td>
<td>7x1%</td>
<td>Group</td>
<td>Fill out Google forms</td>
</tr>
<tr>
<td>Peer-assessment</td>
<td>7x1%</td>
<td>Individual</td>
<td>Fill out Google forms</td>
</tr>
<tr>
<td>Assessment of the presentations</td>
<td>5x2%</td>
<td>Individual</td>
<td>Fill out Google forms</td>
</tr>
<tr>
<td>Final R markdown code</td>
<td>13%</td>
<td>Group and Individual</td>
<td>Submission</td>
</tr>
<tr>
<td>Final version of decision-support tools (Power BI dashboard and/or SAP Hana app)</td>
<td>13%</td>
<td>Group and Individual</td>
<td>Upload on Power BI Report server and/or SAP HANA app server</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>Total 100%</td>
</tr>
</tbody>
</table>

Important:

- Considering that all assessment tasks are “take-home”, there are no make-up options.
- Submission deadlines are indicated on the Canvas calendar and assignment dropboxes.
- Deadlines can be extended for the two last (“Final”) deliverables per a group request. Submission deadlines for all other assessment tasks are “hard-stop”, that is late submissions will receive a score of zero.

Pass requirements

50% of the overall score AND an equal contribution to at least four major deliverables:

- For example, if a student was sick to the extent that made impossible to participate in preparing three or more deliverables then such a sickness, being indisputably acknowledged as an adverse factor beyond the student’s control, is also acknowledged as an adverse factor that made impossible achieving learning objectives.
- For example, if a student’s contribution to the development of deliverables has been consistently low, according to her/his team members, the teaching staff will
make an independent assessment of that student contribution based on the team working plans.

Description of assessment tasks

<table>
<thead>
<tr>
<th>Assessment task</th>
<th>Learning outcome to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to the “Assessment Information” section</td>
<td>Relevant outcomes 1-4 as listed above</td>
</tr>
</tbody>
</table>

Inclusive learning

Students are urged to discuss privately any impairment-related requirements face-to-face and/or in written form with the courses convenor/lecturer and/or tutor.

Legal aspects: intellectual property and proprietary/sensitive data

The data set used in the course belongs to the organization provided it. Moreover, despite certain measures had been taken to remove/disguise the information about third parties (for example, customer names) the data still contains sensitive information about the company provided it (for example, the overall performance, trends, etc.). Therefore, to access the data set, students will be required to sign a non-disclosure agreement. In particular, by participating in this course each student agrees:

- To not make any copies of the data and access the data only by connecting to servers used in this course
- To not share the access information (login/passwords/key files) with anyone and store it using specialized software such as KeePass (https://keepass.info/).
- To not share with anyone, besides students enrolled into the course and teaching staff, any information (business insights) derived from the data unless it has been already published on either the company web site or the UOA business school web site.

These are strict requirements because a legal action can be taken both against a student and the university in case of an unauthorised information disclosure.

Enrolment in the course is conditional on signing a non-disclosure declaration during the first week of classes.

Comments:

- Clearly, a possibility to demonstrate the dashboards and other deliverables students created in this course to perspective employers can be highly beneficial to students. In addition, a possibility to publish at least screenshots of some of the artefacts on the business school web site can be highly beneficial for the university. Therefore, all reasonable efforts will be made by the teaching staff to negotiate relevant permissions with the data set owner.

- Typical examples of not following the above requirements would be: (a) using a password such as “123456” or the same password as for the university/email account, (b) keeping the password written on a piece of paper, (c) making a copy of the data because it is not possible to access it from home, (d) sharing with students not enrolled in the course that, for example, “It turns out that Heineken is more popular than ...” or “Interestingly, we found that the company holds too much safety stock”.


As a rule, companies providing the data do not even allow sharing findings with most of their employees, even with those who have access to the raw data.

**Academic integrity**

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student’s own work, reflecting his or her learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the worldwide web. A student’s assessed work may be reviewed against electronic source material using computerised detection to provide an electronic version of their work for computerised review.

**Comment:**

- Note that sharing the information about steps required to produce a meaningful analysis with students not enrolled into the course is also not allowed as this may result in a violation of the academic integrity. Those students may enrol into the course later and take unfair advantage of other students by making use of the information shared with them earlier.

**Student feedback**

We expect that the course will be challenging. Students are welcome to provide any type of feedback at any time. Apart from everything else, knowing your experience on the following will be of a particular value, and be highly appreciated:

1. Having completed the course, what specific knowledge and skills did you find you were lacking most (e.g., proficiency with JavaScript)? Are you aware of any courses in which you could have learned them if you were given a timely advice (e.g., for R it could be STATS 208, for efficient ETL it could be INFOSYS 222)?
2. If you identified any particular skills that you think would be helpful to have when you started this course would you suggest teaching them in any of Stage-1 and Stage-2 ISOM courses (e.g., INFOSYS 110, INFOMGMT 192, etc.)?
3. Having found a job, knowledge and skills acquired in which courses (if any), do you think proved most helpful for landing a job? Are there any you wish you had taken?

**In the event of an unexpected disruption**

We undertake to maintain the continuity and standard of teaching and learning in all your courses throughout the year. If there are unexpected disruptions, the University has contingency plans to ensure that access to your course continues and your assessment is fair, and not compromised. Some adjustments may need to be made in emergencies, In the event of a disruption, the University and your course coordinators will make every effort to provide you with up to date information via Canvas and the University website.

**Graduate profile for Business Analytics**

The following six themes represent the capabilities that the Business School seeks to foster in all of its graduates. The development of these capabilities does not come all at once, but rather is expected to build from year to year. Each course is not expected to contribute to all capabilities, but each course will have its own goals and learning outcomes that relate to the overall development of this profile.
**Bachelor of Commerce**

<table>
<thead>
<tr>
<th>Graduate Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disciplinary knowledge and practice</strong></td>
</tr>
<tr>
<td>Graduates will be able to demonstrate and apply a breadth of knowledge across disciplines, as well as specialist knowledge within one or more of them, while recognising the relevancy of this knowledge within a global context.</td>
</tr>
<tr>
<td><strong>Critical thinking</strong></td>
</tr>
<tr>
<td>Graduates will be able to analyse and critique theory and practice to develop well-reasoned arguments.</td>
</tr>
<tr>
<td><strong>Solution seeking</strong></td>
</tr>
<tr>
<td>Graduates will be able to identify and frame problems using analytical skills to create and evaluate innovative solutions.</td>
</tr>
<tr>
<td><strong>Communication and engagement</strong></td>
</tr>
<tr>
<td>Graduates will be able to collaborate and communicate effectively in diverse contexts using multiple formats.</td>
</tr>
<tr>
<td><strong>Independence and integrity</strong></td>
</tr>
<tr>
<td>Graduates will be able to respond professionally and ethically, demonstrating a capacity for independent thought and learning.</td>
</tr>
<tr>
<td><strong>Social and environmental responsibility</strong></td>
</tr>
<tr>
<td>Graduates will recognise the significance of the principles underpinning the Treaty of Waitangi and consider their obligations in relation to sustainability, whilst displaying constructive approaches to diversity.</td>
</tr>
</tbody>
</table>

Note that if you are enrolled in a conjoint degree, you should also engage with the Graduate Profile for your other degree programme.