Background on the Analytical Consulting Lab

The Analytical Consulting Lab (ACL) is part of the Kellogg experiential learning initiative. The specific interest in the Analytical Consulting Lab comes out of the deep demand for business leaders that can provide guidance in analysis and focus that analysis to specific business questions. Additionally, many recruiters and employers have commented that finding talent that bridges the business and analytical communities is difficult. The ACL strives to provide a real-world learning experience for students to work with sponsoring companies on business questions that revolve around analysis. Students work in teams using analysis (broadly defined) to answer current and important business questions.

Kellogg has a strong tradition in bringing analysis to bear on business questions. In fact, the Analytical Consulting Major is the second most popular major at Kellogg, suggesting that not only does the ACL support this major, but it will resonate strongly with the goals of many a Kellogg MBA student.

READ THIS!!!!! Course Expectations

Analytical Consulting Lab is an experiential class, with a strong focus on the application of analytics and market measurement in a real-world, client-facing, consulting environment. It provides an excellent opportunity for Kellogg MBA students to get real-world experience in consulting and in applying analytics and market measurement techniques to actual business challenges and opportunities.

In previous years, some students have expressed expectations of the course that are outside the scope of the class. Therefore, it is important to set some very important expectations in regards to this class:

- The class does NOT involve lectures to present new theory or analytical techniques. Students seeking new analytical techniques or lectures on analytics, primarily, should consider other courses for that goal. This is a class on the application of analytics in a real-world, team-based environment.
You will work in a team. Team dynamics will be instrumental in your experience. It is important that you are available, accountable, dedicated, and willing to contribute in a team. In most cases, you get to choose your teammates. Be extremely open and honest with your teammates in terms of their contribution and hold each other accountable in a supportive and respectful manner.

The Professor is your advisor, coach, aide, and sounding-board. He is here to help you in your journey through the project. The MBA team is in a leadership role to execute the project, communicate and present to the client, and formulate recommendations.

The Professor can help you with reviewing regression, analytical concepts, data visualization, consulting best practices, and most any topic that arises on the project. Execution of the project is, however, the responsibility of the MBA team.

Each project in ACL is unique, real, and driven by an actual client-facing challenge or opportunity. Your project will vary from others. Projects have different goals, different analytical opportunities, and clearly different clients. You can apply for the project(s) that most interests you.

ACL is a lot of work, a lot of learning, and a lot of fun. Many students consider it a top Kellogg experience. Be sure that your schedule, life, and other commitments permit you to get the most from the class.

Course Details

The ACL is offered as MECN-615, a full credit course. Most projects in the ACL are sponsored by Kellogg alumni, at very senior levels in their organizations. Students taking the ACL are assured a strong learning experience and a commitment from the firm to provide access to decision maker and information that will make the experience meaningful.

Details on projects, companies, and information about selecting projects is available at: http://kellogg.northwestern.edu/faculty/walker/htm/acl
Application Process

Students interested in the ACL must submit an application for project selection.

The application permits optimal project assignment, based on student goals, client needs, and project requirements.

Application and project preferences will be gathered by the EL team at Kellogg. Look for specifics on how to submit your interest via emails to the IY and MMM groups.

Student information in the application process is used in formulating teams and assigning projects so that goals, backgrounds, skills, and expectations are all best aligned.

Project Assignment

Student assignments to client projects will be based on individual preferences, requested skill sets and industry experience, and team member diversity. Every attempt will be made to grant students their first or second choice of projects. Student information is collected via the application. Students may select one fellow student for a project. This fellow student selection is honored as possible, if the both students select each other. Students will be notified about their project assignments during the term before the class. All efforts are taken to accommodate first choices, while forming teams with an appropriate set of skills and interests.

Case Packet and Readings

As this course is an experiential one, there are no specific cases to prepare. However, many students have looked for examples of companies that have excelled at Analytics. Also, as the course emphasizes consulting and best practices in a professional client engagement, there is a need to consider some of these best practices. Given this, the following texts are recommended and optional:


These texts are easily purchased on-line, so these are not requested in the bookstore.

Course Meetings

As with other experiential courses, the focus is on the team project and its delivery to the sponsoring company.

Teams will meet with the Professor on a regularly and frequent basis in order to discuss the analysis, flow of work, final presentation and delivery to the sponsoring team. The class will also meet with the prescribed schedule to review concepts and themes important in being successful with the analytical consulting function and in order to provide presentations for the purpose of group learning.
All Group Meetings are to be held with the team and the Professor at a pre-defined time that works mutually. Meetings with the Professor and Client must conclude before 4:30PM on weekdays. PTMBA students are welcome to the class, but cautioned on this scheduling constraint. Students who cannot make meetings in person are encouraged and welcome to join via telephone.

Pre-term activities
- Project identification
- Team formation
- Identification of Team Liaison to Client
- Identification of Team Liaison to Professor
- Client Introduction
- Project description
- Schedule first group meeting with Professor
- Schedule first client meeting with Client

Week I:

Class Session I: July 2
- Getting Started with ACL
- Managing Project Ambiguity
- Managing Teams
- Overview of the Consulting Approach
- Dealing with Data
- Descriptive Statistics

Guest Speaker: NWU Librarian:
Using Business Databases from the NWU Library for market and firm measurement.

Bring your laptop and be ready to explore databases!

Week II:

Group Meeting I: July 2
- Developing a Work Plan, Project Analysis
- Examples of Past Analysis
- Use of Graphics
- Best Practices in Presentation of Data
- Building Points Through Analysis

Week III:

Group Meeting II:
- Preliminary Analysis of Data
- Teams to bring descriptive statistics to meeting with Professor
Work Plans due to Professor

Week IV
Group Meeting III: Focus on Data and Analysis
Address questions and issues in analysis

Week V
Group Meeting IV: Focus on Data and Analysis
Address questions and issues in analysis

Week VI:
Group Meeting VI:
Preparation for final presentation and project conclusion.

Week VII: FINAL PRESENTATION: Week of Aug 19
Class Session II:

Project Findings
Final project deliverable due to Professor and Client on last week of class.
Deliver Final Presentation to Client.

As in any professional consulting engagement, the students are requested to regularly meet with
the client to receive input, data, direction of project goals, and feedback on the progress as
needed. All clients are committed and dedicated to fulfilling the learning and business aspect of
the project.

Class sessions I and II are scheduled to be in an allocated room on those specific dates.

Meetings with the Professor are scheduled to be conference/video/hangout calls. Teams should
email materials to the Professor for the call to be most productive. Documents are not final
deliverables, so teams can send working drafts, spreadsheets, and screen shots. Also, webex
sessions can allow screen sharing. Students are not graded on the content or presentation quality
of materials shared during our meetings.

Professor Walker piloted a virtual/flexible work schedule with the MSMS ACL program this
year. It was positively received by the students. Students appreciated the more flexible scheduling
and greater access to the Professor. This lead to more flexible interactions had positive reviews.

Understanding the demanding summer schedule for the students, given the success of the virtual
interaction model, and given certain summer commitments of Professor Walker, we will hold our
meetings at mutually agreeable times via conference calls/video calls/hangouts. Teams are
welcome to meet with Professor Walker multiple times a week, and indeed, as much as required.
He is widely available by calls and can meet multiple times and as required to support the team.
Grading

Grading of the project is driven largely by the quality of the team project. The Professor will evaluate the project, its analysis, presentation, and delivery on the following major points:

- **Analysis:**
  - Quality of analysis (thoroughness, appropriateness)
  - Clarity and quality of model summary and description
  - Intellectual impact (was the analysis creative, novel, clever, or otherwise compelling?)

- **Project Document**
  - Quality of project description
  - Quality of analysis summary
  - Quality of recommendations and conclusions
  - Use of meaningful graphs, graphs, and presentation of data

- **Presentation Documents**
  - Quality of presentation
  - Professional impact of the presentation
  - Ability to communicate main points of the analysis and recommendations

- **Team Meetings**
  - Preparation
  - Organization
  - Progress

The Professor will ask the client company to provide feedback on the same above points.

Peer evaluations will also be collected from each member. Each student must rate their teammates on the following dimensions:

- Intellectual and creative contribution
- Workload and willingness to take initiative
- Organization, preparation, and availability
- Collaboration and respect for peers

Peer evaluations will be on a 1-10 scale with 10 being excellent and 1 being poor. All peer evaluations will be treated confidentially.

All ACL students must participate, as participation is also important to make this a meaningful learning experience for all involved.

**Grade Breakdown**

- Professor Evaluation of Final project materials and presentation: 50%
- Client Evaluation of Final project materials and presentation: 10%
- Peer Evaluations (*): 20%
- Professor Evaluation of Preparation during meetings and participation: 20%
* Note: The Professor reserves the right to adjust any student’s final grade up or down by a full letter grade in the event that the student’s peers unanimously score his or her contributions significantly above or below the overall team effort.

**Role of the Professor**

The Professor serves as an aide, counselor, and advisor for the team. The Professor does not conduct the analysis, but will provide detailed direction on analytical approaches. The Professor does not serve as the team liaison or representative to the client. The team must organize itself and identify such a liaison. The Professor may accompany the team to select team meetings and or participate in calls, but the Professor cannot in practically, attend all such meetings.

**Role of the Team**

The team will consist of 3 or 4 Kellogg MBA students working as a team to complete analysis, as defined by the client as agreed to before the start of the academic term.

The team should be mindful to control the amount of time that is required of the client. This means being prepared for meetings, having a designated liaison to schedule meetings, request information, and follow-through with next steps. This level of preparation and understanding is needed as most clients sponsor this project but do not allocate a full-time associate to work with the ACL team.

The team should expect to contribute about 200-280 hours over the 7-week period to this ACL project. This is a reasonable expectation for a team working on a project and is consistent with other experiential and lab courses at Kellogg. This translates to 8-10 hours per person per week.

The team will produce a white paper that documents the study, results, and recommendations. The team will also prepare a presentation and deliver it in person to the client and its team. A reduced version with emphasis on key findings is also to be presented at the last class.

**Role of the Client**

The client provides the real-world learning opportunity, data needed to complete the appropriate analysis, and feedback on the quality of the project and its analysis. The Client is not expect to solve the problem, but should provide ample expertise, data, and contextual information to the ACL team.

**Prerequisites**

All students in the ACL must have completed DECS core. There are no other requirements.

**Some FAQs:**
What is the Analytical Consulting Lab?
It is a course available to Kellogg MBA students that are interested in the use of analytics in business. Students must take specific prerequisites and have strong academic performance in such classes to take the Analytical Consulting Lab. Students work in teams to resolve a real-work business problem using analytics.

What do you mean by Analytics?
It is meant to be broad but includes the use of specific quantitative approaches, such as regression analysis, time series analysis, forecasting, market segmentation, data mining, optimization, logistical analysis, scenario simulation, and risk analysis, as examples. In particular, we mean solving a business problem using data and applying one of these quantitative approaches.

How does this experience benefit the students?
Kellogg MBA students taking the ACL will work on a real-world problem under the direction of a Kellogg faculty member. The opportunity to apply analytical theory and learn about a business, make recommendations, and bring together many aspects of their business education is unparalleled. We also ask that the students focus on how to communicate the results of analysis in the context of business decision-making. For students interested in moving to an industry to deep in analytics after graduation or developing new business skills in analytics, this course will be very attractive.

The Analytical Consulting Major is one of the most popular majors at Kellogg and students have expressed deep interest in developing strong skills in analytics. This course meets an interest in our students and provides them an experiential learning opportunity that will prepare them for business opportunities.

How does the Client benefit from this opportunity?
The ACL is an intensive analytics elective that attracts some of our most analytically talented MBA students. It is expected that the student group of 4 will commit about 400 working hours to the project. Additionally, the student project will be overseen by a Kellogg faculty member that has expertise in analytics and its application in business.

We expect that the project deliverables, recommendations, and report will provide direct value to your organization. However, we also believe that the project provides your organization and opportunity to determine how and where to invest in more analytics. If this includes the acquisition of more analytical talent, the project provides an excellent conduit to members of our student body that are talented and interested in this space.

How does the team work with the Client?
For the student team, the partnering company is a client. They will conduct their analysis and provide recommendations through a report and presentation in the same format and in the same manner as a consulting service. The faculty member also serves as an important liaison between the partner and the student, serving to manage time commitments and negotiate deliverables. It is
expected that the student team can meet with and speak with key members of your team that can help them answer questions relevant to the analysis.

**Which software will we use?**
It really depends on the project and your familiarity with software packages. This course is software agnostic, meaning most software packages are acceptable. The course does not have as a goal to teach a particular package, but rather to enable analytics in a business project. You are welcome to use software of your choice. Most projects can well be completed with a combination of Excel and one statistical package. If you are unsure or unfamiliar with statistical software, we will discuss that during our first meeting. Some packages may have a minimal cost.

**What about the data?**
To make this experience valuable to the students and to solve the business problem at hand, we do need access to data. It is important that the data be available before the project begins. Additionally, the project should make use of “scrubbed” data, that is data that is free of specific information that would be sensitive or otherwise governed by a law, such as social security numbers of customers or names of customers.

**What types of business problems can be considered?**
As analytics is helpful in many business functions, we are open to many applications of analytics. Specific business problems in marketing, forecasting, customer segmentation, pricing, commodity analysis, logistics, risk management, operations, inventory leveling, supply chain improvement, and scenario planning are sure to provide great analytical opportunities.

**Will the analysis become public?**
The work between the students and your organization is considered confidential. If necessary, the students may be asked to sign a non-disclosure agreement. If this is necessary, we ask that the non-disclosure agreement be such that it does not prevent the students from seeking employment or from building on their experience gained on the project.

From time to time, such company-student projects lead to very interesting business lessons. As a leading business school, we are interested in sharing such lessons with our next generation students and business leaders. We do this through business cases. If such an opportunity exists with your project, we will seek your permission to relate the business lesson through a case study.

**How to I join the Class?**
First, you must meet the prerequisites. Then submit your application to Professor Russell Walker before the deadline. The application is used to build teams, assign you to one of your top project choices.

**Contact Information**
Please contact Russell Walker, Ph.D.
Via e-mail at russell-walker@kellogg.northwestern.edu
Summer 2019
ACL Projects
Changing Tastes
Changingtastes.net

Does humane and sustainable meat matter… to shareholders?
The move towards humane, sustainable and antibiotic free meat is well underway in the US restaurant industry, with asterisks about the standards each company is really putting in place and whether it is integral to their brand, or just one of many offerings. Does any of this really affect business outcomes, and is there a case for serving “better” meat? In this project we'll answer this important question. We’ll develop some objective grading systems for ingredients and menus and measure that against a variety of business performance metrics. We’ll also look at the emerging regenerative ranching practices which help repair damaged ecosystems and see if these also offer an opportunity for good business and doing good.

A New Food World: Can the Best Known Early Stage companies all succeed…and what happens if they do?
In recent years, food is one of the most active areas for scaling up new and disruptive business models and attracting the interest and support of investors. And business and food media are full of announcements about companies that intend to dramatically change how we eat, or at least a portion of us eat some of the time. From meal kit delivery businesses like Blue Apron, Amazon, Chef Jet and Hello Fresh that intend to deliver complete meals to our homes and replace both restaurants and grocery stores, companies like Sweet Greens or Roti that intend to be the next Chipotle of one type of cuisine or another, BrightFarms and AeroFrams that will change our relationship to salad (and leafy greens) to Shake Shack and Fat Burger which intend to make their better burgers so irresistible we eat them more often, along with a host of other business models that are about delivering a meal that is somewhere between partly assembled and fully cooked and ready to eat. So the question is: if all this disruption occurs and these startups achieve what they’ve promised their investors and the market, how will we eat, what will our dietary patterns or habits look like, can they all win (or are they forecasting to sell us more than we can eat) and what will happen to larger legacy companies, and are there enough eating opportunities to go around?
Genetically Modified Organisms (GMOs): Understanding Value Creation in the GMO and agricultural technology segment

A recent study by the USDA Economic Research Service concluded that GMO soy and corn have not increased per acre yields over the past two decades but did increase the use of glyphosate, a chemical pesticide in Round Up that is now detected in breast milk and tentatively linked to the rise of gluten intolerance (not a major health concern, but noteworthy). The larger issue is that GMOs have created patentable intellectual property in the agriculture sector, which previously lacked vehicles to create value through information. If not on the field, then where is wealth shifting or being created by the advent of GMOs among companies that sit in the farm input to major food production/processing supply chain. How as intellectual property as a share of valuation shifted among supply chain segments, and/or has the introduction of patentable intellectual property created new value.

One of the above projects is available for the term. The team may choose and should specify in their application. Arlin and Changing Tastes are ACL alumnus clients!
NFL Game Predictions - Further Improvements to A Unique and Successful Data Science Model

Dr. Andy Guyader
www.theq5.com

In May, the United States Supreme Court overturned the Professional and Amateur Sports Protection Act and now states have the legislative authority on sports gambling. The market is expanding - creating more opportunities to attack market imbalances that may exist, especially in early-week NFL spreads. This project aims to improve an already profitable game point differential predictive model for NFL games. Drive data performance, game and team analysis are incorporated in a novel non-linear multi-dimensional optimization model. A generalized reduced gradient solver produces an optimal solution over the 32 team space, uniquely taking into account the quality of opponents.

The point prediction model was trained on only four years of complete regular-season NFL data and executed in real-time during the 2017 season. Model version 1.0 in 2017 recorded a 26-12 record and a mutual fund style betting model produced a 38-percent Return On Investment (ROI), including the vigorish. In preparation for the 2018 season, training was implemented on all 11 years of data: 2007-2017. Historical analysis shows improvements in fund model ROI, a t-stat calculation nearing 2.75 and an expected number of games triggering to near 75. Historical analysis and week to week fund visualizations are shown in Figure 1. These numbers top all journal published models dealing with point spread betting.

Improvement for the model exists in several areas of study - the gradient solver, the current game and team covariates as well as increasing the number of them, implementation of Kelly Criterion for the betting mutual fund model, creating in-season variations to the model, the inclusion of injury data and several others. No data management will be required unless new data is introduced. Currently the data set includes over 100,000 lines of drive data in chronological order with starting field position, plays, yards covered, drive result and unique IDs for game and drive. Game score results are also included.
The effort will focus on improving ROI and investment decisions in predicting football outcomes, from the perspective of an investor.

Dr. Guyader and theQ5 are ACL client alumni clients!
Project Evaluation of Equity Investments in the US and globally

The global economy is in unique situation. Energy prices are low and according to many forecasters, can be expected to be low for many years. Interest rates are low and in fact some economies in the developed work are seeing deflationary pressures. Agricultural commodities have deflated in recent years. Essentially, costs to operate businesses are low, but earnings and growth are absent in many industries. Technology firms have enjoyed rapid increases in stock prices recently and investors have been very bullish on this sector. China’s annual percent GDP growth is higher than the US or Europe, but it is slowing.

The team will examine the conundrum of the US and global economy for strategies to invest in equities. The task is to develop a thoughtful, risk-driven, approach to considering broad industry or sector investments (no necessarily individual firms). Moreover, the approach should be compelling and explain how current and changing macro-economic and demographic realities will likely impact the investments.

JR, project sponsor, is a Kellogg alumnus!
**Northwestern University Athletics**

**Project Description:**

Football single-game ticket sales

We’d like to see an analysis of why single-game buyers came to the game (NU fan, fan of visiting school, family outing, etc.). Based on that analysis, we’d then want to look at our advertising – did that affect their decision to attend the game? And if so, what was most effective? The goals of the project would be to understand why people buy single-game tickets, when they buy single-game tickets, and then how we can better advertise/market to these groups.

**NU Athletics is an ACL alumnus firm!**
Project Title: Adjacent and Transformative Growth Opportunities for a Private Bank

Background: Brown Brothers Harriman is a global firm that has 5,000 employees in 18 offices with expertise in Private Banking, Investment Management and Custodial Banking. BBH Private Banking serves private and corporate clients throughout the cycle of wealth creation, transition, preservation and growth across 3 products: Private Wealth Management, Corporate Advisory and Banking, and Private Equity.

Complication/Opportunity: Wealth managers and legacy banks are under pressure to evolve wealth management revenue models and existing investment and credit product suites, on the back commoditization of investment management. While the AUM-based, wealth management model will continue to dominate for the foreseeable future, leading wealth managers are considering how to grow new lines of business to both diversify and grow. Thus, Private Banking would like the team to determine 3 new, viable adjacent and 3 new, viable transformative business ideas that do not involve the sale of wealth management services (i.e. the discretionary management of investments). The team should consider BBH’s existing competitive assets, data sets, talent pools, as well as the current economic environment. The project should be based in the core-adjacent-transformative growth framework. The team should review innovative models deployed by other wealth management firms, as well as other sectors/industries. The ideas should be implementable within 2 years, and have a projected growth in excess of $1mm of topline.

BBH and Nick of the ACL! Nick is a Kellogg alumnus and class alumnus!
National Football League
nfl.com