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Description
This course focuses on the fundamentals of what artificial intelligence is, how it is applied in business, and why it is heralded as the next industrial revolution. This course requires no prior technical knowledge, starting with an examination of what machine learning and artificial intelligence is, how it functions, and where it excels. We progress to building AI models, exploring potential benefits and pitfalls of AI in comparison to traditional decision-making and how the two are complementary, and discussing best-practices on implementation at organizations. We cover both the historical origins of AI---including how IBM’s Deep Blue and Google’s AlphaGo beat Chess and Go Grandmasters---as well as modern applications across a broad range of business sectors and applications. This course is a lecture-based course with case-based discussions, group activities and projects, and a final individual assignment. The overarching goal for the course is to enable you to confidently lead data science and design teams, know the expansiveness and limits of AI, and be capable of applying human and machine thought partnerships to grow businesses or disrupt Grand Masters in any field.

Grading
*Human and Machine Intelligence* is an exciting, and misunderstood, topic area in business education. While there has been extensive writing about Artificial Intelligence and Machine Learning in the popular and business press, it is difficult to create a coherent understanding of the field from those pieces.

That is why in the assignments you are tasked with the most difficult task in this space – to explain complicated, technical concepts and your reasoning on its usage in a way that a lay person could understand. As a part of this, I expect you to engage with the assignments in a way that your written work is thorough, explanatory, and reflective. The following grading rubric will be used for all assignments.

A+ — All prompts are thoroughly answered and demonstrate a critical understanding of the material. The assignment is presented in a narrative that would be understandable and educational to a lay-person not in the class.

A to A- — All prompts are thoroughly answered and demonstrate a critical understanding of the material.

B+ to B- — All prompts are answered, but there are gaps in the completeness of the answer or parts of the answer may conflict with other answers given without clear explanations.

C+ and lower — Answers are incomplete or display a shallow engagement with the underlying concept behind the question. Poorly argued points or narrative elements that are unclear in their relation to the prompts answer

Assignments (90%) A series of individual and group assignments will give you first-hand
experience in understanding how machine-learning is used to make business decisions. Assignments 1 and 3 are due by Midnight CST on the listed date in Canvas.

Assignments 1 and 2 are group assignments. To ensure that all group members make active contributions peer evaluations will be completed. **These peer evaluations will be used to adjust a group's assignment grade into an individual's assignment grade.** As an example:

A group of Adam, Bob, and Charlotte received a score of 90% on Assignment 1. Adam did not show up to planned meetings and did not communicate his absences or suggest other ways he could contribute. Thus, Bob and Charlotte score his contributions as a B (80%). The group score of 90% is then changed to an individual score of 72% for Adam.

Groups should communicate directly with the Professor if there are systemic issues in the group dynamic before the course is completed to resolve issues.

**Participation (10%)** Sharing insights and participating in class discussions is integral to success in the course. Completing activities that carry no explicit grade (i.e. submitting additional documents or business plans for discussion) are also a part of your participation grade.

**Attendance** Given the short duration of the course attendance is essential and taken every class session using a Canvas link and a photograph before class starts. Students are considered ‘absent’ if they are not recorded with the canvas app or the photograph.

**Each unexcused absence will deduct 3% from your grade.** If your assignment and participation grade was 97% but you have an unexcused absent, then your final grade would be 94%.

If you have an absence that should be excused due to personal illness, illness or death in your family, or other similar circumstances make sure to e-mail Professor Pah (a-pah@kellogg.northwestern.edu) so that it can be recorded as an excused absence.

If you are choosing to miss class to travel, conduct a phone interview, etc. then there is no need to e-mail and notify Professor Pah.

**Honor Code**
As with all Kellogg courses, by enrolling in this course you agree to abide by the Kellogg Honor Code. In this course you may (and are encouraged to) discuss both the individual assignments and group assignment with your fellow students; however, the finished product that you submit should be entirely your own work. If you have any questions regarding how the honor code applies to this course, please ask.
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<tr>
<td>1</td>
<td>Group: Who are you hiring?</td>
<td>30%</td>
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<tr>
<td>2</td>
<td>Group: AI Canvas</td>
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<td>3</td>
<td>Individual: National Parks</td>
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<td>Individual: Participation</td>
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Week 1 — Building Blocks

Session 1. What, Why, and Where?
What is machine-learning? Where can you use it? Why should we use it? What benefits does it have over other traditional methods of analysis, prediction, and decision-making? What business problems are machine-learning and artificial intelligence most suited to?
Video: From hacking the iPhone to self-driving – Comma.ai’s maiden voyage
Before Class Reading:
• McAfee and Brynjolfsson. Machine, Platform, and Crowd. Ch 2, pgs 28-36
Before Class Watching:
• “If Robots Want to Work with Us” [link]

Session 2. How?
How does an algorithm actually work? How do the limitations of machine-learning compare to traditional knowledge building. Are these limitations different, or a new version of an old problem? difference between correlation and causation.
Before Class Reading:
• “Who, What, Why: How do cats survive falls from great heights?” [link]
• “A visual introduction to machine-learning.” [link]

Assignment 1: Who are you hiring? Explanation and distribution. Out-of-class exercise: Submit a plain text file (so a '.txt' file - very important!!) of more than 1,000 words of your writing. This is not new text you are writing, just copy and paste your resume, application cover letters, blog posts you’ve written, etc. into a single text document and submit it at [link] by midnight.

Week 2 — Replicating Human Insight

Session 1. Machines replicating humans
What is a neural network? What has made it so powerful? What differentiates it from other approaches we have learned? What questions does this create about the future?
Video. AlphaGo
Before Class Reading:
(Optional) Before Class Watching:
• Sunspring. [link]

Session 2. Who are you hiring?
In-class activity: Who are you hiring data switch and discussion.
• Looking to hire somebody? Skip the interview. [link]
Week 3 — Practicum

Session 1. Evaluating Machine Effort
How do you judge goodness? Recalling accuracy, precision, and judging the ‘badness’ of bad. Comparing machine-learning to human decision-making. What is bias and variance?

Before Class Reading:
McAfee and Brynjolfsson. *Machine, Platform, and Crowd*. Ch 2, pgs 36-44.

Session 2. Application as Process
The AI Canvas. Identifying and evaluating AI opportunities.

Assignment 2: AI Canvas. Explanation and distribution.

Week 4 — Knowledge Building

Session 1. Cognitive Analytics
What is Cognitive Analytics and, by extension, Watson? Why was Watson’s task so much harder than playing chess? Building a ‘natural’ understanding in an unstructured world.

Videos. Jeopardy

Before Class Reading:

Session 2. Building Machine Models
Predicting customers that will default on their debt. In-class instruction on building machine-learning models on the Microsoft Azure model. Discussing the gap between model predictions and business decisions.

Dataset: credit_delinquency.csv
Week 5 — Frontiers

Session 1. The Cost of Data
Machine-learning and societal outcomes. The ease of red-lining and the danger in not asking questions.

Before Class Reading:

Session 2. AI Canvas Presentations
Group presentations of AI Canvas.
Presentations will be 10 minutes and peer-graded.