15.572: Analytics Lab: Analytics, Machine Learning & the Digital Economy

SYLLABUS AS OF NOVEMBER 13, 2015 –
CONSULT STELLAR FOR MOST UP-TO-DATE INFORMATION AND READINGS

Instructors
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Class times
Tuesdays 4-5:30pm, E51-335
Workshops 4-8pm, September 18, Bartos Theater (E15)
4-9pm, December 8, Bartos Theater (E15)

Project Mentors
Sagit Bar-Gill sbargill@mit.edu
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Teaching Assistant
Fei Gao feigao@mit.edu

Course Support Team
Susan Young susany@mit.edu
Chuck Gibson cgibson@mit.edu

Office Hours
By Appointment

Summary and Objectives:

The growth in big data and analytics is transforming in management decision-making, operations, marketing, finance, and product innovation. Businesses across the world are wrestling with challenges and opportunities that call for the application of analytics. We are on the cusp of a second machine age – a digital era that holds opportunities and challenges for both individuals and the economy. Workers and professionals in all fields are racing to acquire the skills and capabilities necessary to survive and thrive in this digital revolution.

The purpose of the Analytics Lab (A-Lab) is to match student teams with leading-edge projects involving analytics, machine learning or digital technologies as they apply to business questions and problems. The particular focus of the projects is on the technical aspects, but business relevance sets the context and nature of the technical problem.

Teams of three will form and select projects in the first two weeks of classes. Project proposals have been received from the following organizations: Accenture, Akamai, Amazon, BASF, Boston Public Schools, BuyerZone, Christian Science Monitor, Dell, Graduate Management Admission Council, Intursa, Kairos, MasterCard, Micronotes, Nasdaq, Raise Marketplace, Schindler, Telemetry Sports, and Zensar.
Course Principles and Expectations:

The primary criterion for projects is to provide a learning experience for the students. In addition, the projects should be of high relevance and interest to a particular organization and senior managers and professionals in it.

Project teams are expected to work independent of regular class meetings, possibly including travel. Project sponsoring organizations will cover costs of travel and lodging, if any. Each project team will have an MIT-associated faculty or research mentor to provide guidance and assistance and a link to outside project sponsors on an as-needed basis.

Students will have the opportunity to attend skill seminars designed around issues they are confronting as they work to complete their project work. Attendance is optional but strongly encouraged.

Two special sessions are scheduled: Match Day on September 18 (4-8pm) and Final Presentations Workshop on December 8 (4-9pm). Attendance at both sessions is required.

Notes on Class Activities and Due Dates:

- Prior to 9/15: Students will given project proposals from all project proposing companies and are expected to be familiar with them before the first session.
- 9/15: The first session will be followed by an informal session to facilitate team formation. Pizza will be provided.
- 9/18: On Match Day (4-8pm, Bartos Theater, http://whereis.mit.edu/?go=E15), we will meet jointly with the representatives from project proposing companies. Each will briefly describe their project as proposed, and students will have an opportunity meet and informally mix with them and fellow students. The session will be followed by a reception. The chief aim of this session is to help inform student team formation and project selection.
- 9/22: The third session will be followed by another informal pizza session to further facilitate the team formation and project selection process ahead of the 9:00pm deadline (see below).
- 9/22, 9:00pm: DUE: team formation and project selection preferences; each team should submit one document (guidelines posted on Stellar, “Team Formation for Projects”) to Fei Gao (feigao@mit.edu). In the following days, faculty, mentors, and the course support team will work out assignments of projects to teams, subject to review by the proposing company.
- 9/28: Final team-project pairings will be communicated to students.
- 10/6, 9:00pm: DUE: project plan; each team should submit one document to their mentor and Fei Gao.
- 10/26, 9:00pm: DUE: mid-point presentation slides; each team should submit their slides to their mentor and Fei Gao.
- 10/27 and 11/3: Student teams will deliver 5-7 minute updates on their project work at the mid-point of the term. The chief aim of these sessions is to help illuminate issues common across teams in order to foster collaboration and set the agenda for the optional skill seminars to follow.
- 12/7, 9:00pm: DUE: final presentation slides; each team should submit their slides to their mentor and Fei Gao.
- 12/8: During the Final Presentations Workshop (4-9pm, Bartos Theater), each team will present their project work to an audience of experts, entrepreneurs, and executives, including representatives from
project sponsoring organizations. Teams will have 8 minutes to present their project work and 4 minutes for Q&A.

• 12/11, 9:00pm: DUE: final report (10 pages maximum, 3000 words, not including figures); report should consider feedback received during final presentations on 12/8. Each team should submit one document to their mentor and Fei Gao.

Grading:

- 40% final presentation content and delivery – team-wide
- 30% final report – team-wide
- 10% mid-point presentation content and delivery – team-wide
- 20% contribution to class discussions and team project enablement – individual

Required Book:

Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking, Foster Provost and Tom Fawcett. 2013. O’Reilly Media Inc. (Online access available at http://library.mit.edu/item/002221893)

All other required readings are freely available on the course Stellar site: https://stellar.mit.edu/S/course/15/fa15/15.572/

Optional:

## Class Schedule:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Session</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>S1</td>
<td>9/15</td>
<td>4:00-5:30 Welcome Lecture: The Economic Payoff From Analytics</td>
<td>Erik Brynjolfsson</td>
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<td>S2</td>
<td>9/18</td>
<td>4:00-8:00 Match Day</td>
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<td>S3</td>
<td>9/22</td>
<td>4:00-5:30 Lecture: Social Analytics – A Deep Dive</td>
<td>Sinan Aral</td>
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<td>S4</td>
<td>9/29</td>
<td>4:00-5:30 Lecture: Big Data Is Not About the Data!</td>
<td>Gary King</td>
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<td>S5</td>
<td>10/6</td>
<td>4:00-5:30 Lecture: Data Driven – Creating a Data Culture</td>
<td>Hilary Mason</td>
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<td>S6</td>
<td>10/27</td>
<td>4:00-5:30 Mid-Point Presentations</td>
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<td>S7</td>
<td>11/3</td>
<td>4:00-5:30 Mid-Point Presentations (cont.)</td>
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<td>S8</td>
<td>11/10</td>
<td>4:00-5:30 No Class – Team-Mentor Meetings</td>
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<td>S9</td>
<td>11/17</td>
<td>4:00-5:30 Optional: Skill Seminar – Handling large datasets/building databases</td>
<td>Paramveer Dhillon</td>
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<td>S10</td>
<td>11/24</td>
<td>4:00-5:30 Optional: Skill Seminars – Data visualization and “big data as a UI problem”</td>
<td>Cesar Hidalgo</td>
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<td>S11</td>
<td>12/1</td>
<td>4:00-5:30 Optional: Skill Seminars – Deep learning</td>
<td>Daniel Rock</td>
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<td>S12</td>
<td>12/8</td>
<td>4:00-9:00 Final Presentations Workshop/Wrap Up</td>
<td>Guests, Erik/Sinan</td>
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No Class For Two Weeks: Monday Schedule on Tuesday (10/13) and SIP (10/20)
Reading List:

Session 1: *The Economic Payoff from Analytics* (Erik Brynjolfsson) (9/15):

1. Carefully review all project proposals and this syllabus.

Optional Reading:


Session 2: *Match Day: Meet Project Proposers* (9/18):

Optional Reading:


Session 3: *Social Analytics: A Deep Dive* (Sinan Aral) (9/22):


Optional Reading:


Session 4: Big Data Is Not About the Data! (Gary King) (9/29):


Optional Reading:


Session 5: Data Driven: Creating a Data Culture (Hilary Mason) (10/6):


Optional Reading:


Session 6: Mid-Point Presentations (10/27):

Session 7: Mid-Point Presentations (11/3):

Session 8: Discussion of Issues (11/10):


Sessions 9-11: Optional Skill Seminars (11/17, 11/24, 12/1):

Optional Reading:


35. Browse: http://www.enlitic.com


Session 12: Final Presentations Workshop/Wrap Up (12/8):