15.S06 Fall 2014
Analytics Lab:
Analytics, Machine Learning & the Digital Economy
Professors Sinan Aral & Erik Brynjolfsson

SYLLABUS AS OF OCTOBER 23, 2014 –
PLEASE CONSULT STELLAR FOR MOST UP-TO-DATE
INFORMATION AND READINGS

Instructors
Professors Sinan Aral & Erik Brynjolfsson

Classroom
E51-376

Class times
Tuesdays 4-5:30pm (September & October)
Workshops 3-6pm, September 11 & 10am-4pm, December 5

Teaching Assistant
Noel Sequeira noel.sequeira@sloan.mit.edu

Project Mentors
Chuck Gibson cgibson@mit.edu; Paul Grigas pgrigas@mit.edu;
Hossein Ghasemkhani hosseing@mit.edu; Frank MacCrory
maccrory@mit.edu, Renee Richardson Gosline rgosline@mit.edu;
Shachar Reichman shachar@mit.edu; Deborah Soule
dsoule@mit.edu; George Westerman georgew@mit.edu

Administrative Assistant
Susan Young susany@mit.edu

Office Hours
By Appointment

Email: sinan@mit.edu; URL: http://web.mit.edu/sinana/www/
Email: erikb@mit.edu; URL: http://digital.mit.edu/erik/

Summary and Objectives:

Action learning seminar on analytics, machine learning and the digital economy

The unprecedented growth in big data and analytics is driving a revolution 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 age comparable to the advent of the steam engine, the internal
combustion engine, and electricity. This will be an 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
big data, analytics, or digital technologies such as machine learning as they apply to business questions
and problems. The particular focus of the projects is on the business rather than the technical aspects.
Project teams of three or four will be formed which mix levels and types of experience. Project proposals have been received from the following organizations, and more may come: Amazon, BASF, Capgemini, Center for Digital Business, Enlitic, Fusion, GE, Houghton Mifflin Harcourt, IBM Watson, Imagitas/Pitney Bowles, Marathon Data Systems, Northwestern Mutual, Open Source Media, Thomson Reuters, WOOX Innovations, 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. Each project team will have an MIT-associated faculty or research mentor to provide guidance and assistance and a link to outside project sponsors.

Students will be expected to attend all the weekly 1.5 hour class sessions in September and October, some of which will have guest speakers from proposing organizations listed above. In November and December, each student team should plan to meet weekly with their research mentor. In addition, there will be a special session on September 11 for matching team interests with corporate sponsor proposals. On December 5 the seminar culminates with an all-day workshop of presentations by each of the teams, with invited guests including sponsoring corporate project representatives.

**Class Meetings and Activities:**

1. Regular class meetings: Tuesdays from Sept 9 through October 28 (except SIP Week) from 4:00 pm - 5:30pm; wrap up session December 9.

2. First Session, on September 9, will be followed by an informal pizza-provided session to facilitate team formation.

3. Match Day session: Thursday, September 11, 3:00 pm - 6:00 pm. We will meet jointly with the representatives from each project proposing company. They will briefly describe their project as proposed, and students will have an opportunity to circulate to tables to meet each of them and informally mix with them and fellow students. The Session will be followed by a reception for all.

4. OPTIONAL: Friday, October 10, 6:00 - 7:30pm: Conference on Digital Experimentation (CODE), Fireside Chat on “Experimentation and Ethical Practice” location and further details to be announced.

5. Final Workshop: Friday, December 5, 10:00 am - 4:00 pm: final presentations, all students entire session.
6. **Milestones and due dates:**

- September 16: team formation and project selection preferences due by 9:00 pm; each team should submit one document to Noel Sequeira <noel.sequeira@sloan.mit.edu>; in the following days, faculty mentors will work out assignments of projects to teams, subject to review by the proposing company.

- September 23: final resolutions will be communicated to students by September 23.

- September 30: project plan due by 9:00 pm; each team should submit one document to Noel Sequeira <noel.sequeira@sloan.mit.edu>.

- In November and December, project teams are expected to work independent of regular class meetings, with advice and assistance available from the instructors and mentors, with the opportunity for travel as may be required. Project sponsoring organizations will cover costs of travel and lodging, if any.

- December 10: final report due by 9:00 pm (10 pages maximum, word-limit of 3000 words); report should consider feedback received during final presentations on December 5. Each team should submit one document to Noel Sequeira <noel.sequeira@sloan.mit.edu>.

**Grading:**

- 30% final presentation content – team-wide
- 30% final presentation delivery – team-wide
- 20% timeliness and quality of milestones – team-wide
- 20% contribution to class discussions and team project enablement – individual

**Required Reading:**

# Class Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Session</th>
<th>Lecturer</th>
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</thead>
<tbody>
<tr>
<td>S1 9/9</td>
<td>4-5:30pm</td>
<td>The Economic Payoff From Analytics</td>
<td>Erik Brynjolfsson</td>
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<tr>
<td>S2 9/11</td>
<td>3-6pm</td>
<td>Match Day: Meet Project Proposers</td>
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<tr>
<td>S3 9/16</td>
<td>4-5:30pm</td>
<td>Social Analytics: A Deep Dive</td>
<td>Sinan Aral</td>
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<tr>
<td>S4 9/23</td>
<td>4-5:30pm</td>
<td>Team Meetings</td>
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<tr>
<td>S5 9/30</td>
<td>4-5:30pm</td>
<td>Machine Learning at Scale</td>
<td>IBM Watson Team</td>
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<td>S6 10/7</td>
<td>4-5:30pm</td>
<td>Experimentation and AB Testing</td>
<td>Brooks Bell</td>
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<tr>
<td>S7 10/14</td>
<td>4-5:30pm</td>
<td>The Analytics Advantage</td>
<td>Jeremy Howard</td>
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<tr>
<td>S8 10/21</td>
<td>4-5:30pm</td>
<td>SIP - NO CLASS</td>
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<tr>
<td>S9 10/28</td>
<td>4-5:30pm</td>
<td>The Art of Data Science</td>
<td>Foster Provost</td>
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<td>(rescheduled from 9/23)</td>
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<tr>
<td>S10 11/4</td>
<td>4-5:30pm</td>
<td>Team Meetings With Mentors</td>
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<tr>
<td>S11 11/11</td>
<td>4-5:30pm</td>
<td>Team Meetings With Mentors</td>
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<tr>
<td>S12 11/18</td>
<td>4-5:30pm</td>
<td>Team Meetings With Mentors</td>
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<td>S13 11/25</td>
<td>4-5:30pm</td>
<td>Team Meetings With Mentors</td>
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<tr>
<td>S14 12/2</td>
<td>4-5:30pm</td>
<td>Team Meetings With Mentors</td>
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<tr>
<td>S15 12/5</td>
<td>10am-4pm</td>
<td>Team Project Presentations</td>
<td>Student Teams</td>
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<tr>
<td>S15 12/9</td>
<td>4-5:30pm</td>
<td>Final Wrap Up</td>
<td>Erik and Sinan</td>
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Reading List

Session 1: The Economic Payoff from Analytics (9/9):

Optional Reading:

Session 2: Match Day: Meet Project Proposers (9/11):
6. Carefully review all project proposals

Optional Reading:

Session 3: Social Analytics: A Deep Dive (9/16):

Optional Reading:


Session 4: The Art of Data Science (9/23):


Session 5: Machine Learning at Scale (IBM Watson) (9/30):


Optional Reading:

Session 6: Experimentation and AB Testing (10/7):


22. Kohavi, Ron, Alex Deng, Roger Longbotham, Ya Xu. Seven Rules of Thumb for Web Site Experimenters
   http://www.exp-platform.com/Pages/SevenRulesofThumbforWebSiteExperimenters.aspx

Optional Reading:


http://www.brooksbell.com/blog/surprising-thing-brand-new-highly-advanced-testing-programs-common/

Session 7: *The Analytics Advantage* (10/14):
27. Browse: http://www.enlitic.com

Optional Reading:

Session 8 - Session 14: *Team Meetings With Mentors*:

NO CLASS-WIDE ASSIGNED READINGS:
Reading, interviews and preparation based on team project requirements

Session 15: *Final Project Presentations* (12/5):

*Team Project Reports (Penultimate Drafts)*