# FALL SEMESTER 2016

# ENVR E-135A Syllabus

**Course meets Thursday, 5:30 – 7:30PM, 9/1/2016 – 12/15/2016**

SUSTAINABILITY ANALYTICS

### COURSE DESCRIPTION

The course focuses on how leading-edge business analytics knowledge and skills can be used to strengthen sustainability initiatives by reducing operational expenses and environmental impact. The course provides an understanding of business analytics foundation technologies, architecture, processes and best practices including data warehouse architecture, data modeling and data governance that transforms data into actionable information. During this process, sustainability data are used to develop and explore new insights into a broad range of sustainability key performance indicators/metrics. This new knowledge will empower students to continue exploring and discovering new insights that, when transformed into decisive action, will maximize their contribution for optimizing organizational performance while minimizing environmental impact.

### COURSE STRUCTURE & DELIVERY

Students will learn how analytics transforms data into knowledge, and how analytics tools can employ sustainability data to solve real world operations efficiency and environmental challenges. Foundation analytics knowledge will be provided through lectures and case studies. Analytics experience will be gained by presentations and hands-on workshops with industry leading analytics tools vendors. Guest speakers will include sustainability analytics business executives to provide context with real world examples. A Dashboard Design Contest using publically available sustainability data sources will provide practical skills and insight into visual analytics. The course concludes with a Sustainability Analytics Guided Assessment, which Instructor-coordinated student teams will conduct with Boston-area organizations, concluding with students developing and delivering clients with a Sustainability Analytics Assessment Profile, Roadmap and ROI Recommendations.

### LEARNING OBJECTIVES

 Learn how data warehouse and business analytics empower individuals and organizations to transform sustainability information into stakeholder value.

 Understand the architecture, processes and best practices for integrating and transforming data into business-oriented data models.

 Understand the soft skills and performance-orientation needed to maximize sustainability analytics return on investment.

 Learn how to use analytics tools to interactively explore sustainability dynamics and strategies to discover new and innovative insights to strengthen organizational efficiencies and reduce environmental impact.

## COURSE SCHEDULE

### Week1 Introduction

* Administration
  + Studentspost profile pic (before 1st class)
  + Introductions
* Course overview
  + Sustainability Analytics
  + Schedule
  + Course Objectives
  + Keys to sustainability analytics success
  + Job Market
* Topic Presentation and Discussion
  + Sustainability Knowledge
  + Enterprise Data Warehouse
  + Reporting and Analytics
  + Sustainability Dashboard
  + Sustainability Analytics Assessment and Roadmap
* Assignment
  + MS PowerPivot
    - [Activate Microsoft PowerPivot for Excel 2013](https://support.office.com/en-my/article/Start-the-Power-Pivot-in-Microsoft-Excel-add-in-a891a66d-36e3-43fc-81e8-fc4798f39ea8?ui=en-US&rs=en-MY&ad=MY)
    - [Complete PowerPivot for Excel 2013 Tutorial](https://support.office.com/en-us/article/Tutorial-PivotTable-data-analysis-using-a-Data-Model-in-Excel-2013-f9ad8310-3b5b-48a3-913d-5cc1b364ee46?ui=en-US&rs=en-US&ad=US)
  + MS Power BI
    - [Download MS Power BI](https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-get-the-desktop/)
    - [Complete MS Power BI Tutorial](https://powerbi.microsoft.com/en-us/guided-learning/)
* Demonstration
  + Microsoft Power BI and PowerPivot
* Read
  + Gartner Magic Quadrant for Business Intelligence and Analytics Platforms
  + TDWI Salaries, Roles and Responsibilities

### Week2 Analytics Technologies & Functionality

* Review
* Topic Presentation and Discussion
  + Technologies
    - Reporting and Analytics
    - Database and Data Modeling
    - ETL and Data Governance
  + Functionality
    - Consumers
    - Active Users
    - Power Users
    - Data Scientists
* Practice
  + Sustainability data sets
  + Download and review
* Assignment
  + Sustainability data sets Assessment
* Read
  + The Talent Dividend
  + What Do Data Analysts Most Need from Their Tools by Stephen Few
  + The DW Lifecycle Toolkit by Ralph Kimball, Chap 1-2
  + TDWI – Analytics ROI – Expert Perspective

### Week3 Enterprise Data Warehouse

* Review
* Topic Presentation and Discussion
  + Architecture
  + Extract, Transform and Load (ETL)
  + Data Governance
  + Data Modeling
  + Security
  + Administration
* Practice
  + Develop Sustainability Star Schema
* Assignment
  + Analyze Sustainability data – identify top and bottom (countries)
  + Download and Install QlikSense
* Read
  + Data Sensemaking Requires Time and Attention
  + The 10 Secrets of KPI Success *by Stacey Barr*
  + Measurement, Management and Leadership *by Bob Behn*

### Week4 Business Analysis

* Review
* Topic Presentation and Discussion
  + Business Analysis
    - BI Maturity Model
    - SWOT Analysis
    - Organization-level Requirements
    - Functional Requirements
  + Performance Measurement
    - Strategic Alignment
    - Strategic Initiatives
* Guest Speaker
  + QlikSense Presentation and Demonstration (1 hour)
* Practice
  + Start QlikSense Tutorial
  + Develop Sustainability Strategic Initiative Model
* Assignment
  + Complete QlikSense Tutorials
* Read
  + Competing on Analytics by Tom Davenport (HBR)
  + A Course of Study in Analytical Thinking by Stephen Few

### Week5 Reporting – Descriptive

* Review
* Topic Presentation and Discussion
  + Information Literacy
  + Thinking Structure – Report Maps
  + Organization Level Perspective
* Practice
  + Develop Sustainability Reports in QlikSense
* Assignment
  + Complete Sustainability Reports in QlikSense
* Read
  + Save the pies for dessert by Stephen Few
  + Chartjunk: Vibrations, Grids and Ducks by Edward Tufte

### Week6 Visual Analytics

* Review
* Topic Presentation and Discussion
  + Visual Analytics Best Practices
  + Graphical Selection Matrix
  + Infographics and Visualization
* Guest Speaker
  + Tableau Presentation and Demonstration (1 hour)
* Practice
  + Start Tableau Tutorial
* Assignment
  + Complete Tableau Tutorial
  + Develop Sustainability Reports in Tableau
* Read
  + Sustainability Dashboard Design Guidelines
  + Key Success Factors for a Performance Dashboard
  + Datawatch Healthcare Dashboard

### Week7 Sustainability Analytics Dashboard

* Review
* Topic Presentation and Discussion
  + Sustainability Analytics Dashboard Project
* Practice
  + Begin developing Sustainability Analytics Dashboards
* Assignment
  + Continue developing Sustainability Analytics Dashboards
* Read
  + The Elements of Style, pg. 1-39

### Week8 Sustainability Analytics Dashboard Design Review

* Review
* Topic Presentation and Discussion
  + Presentation Communications Best Practices and Skills
* Assignment
  + Complete Sustainability Analytics Dashboards
  + Prepare presentation
* Read
  + The Elements of Style, pg. 40-82
  + Seven Tenets of Quantitative Data Presentation

### Week9 Sustainability Analytics Dashboard Design Presentation

* Review
* Topic Presentation and Discussion
  + Present Sustainability Analytics Dashboards
  + Provide feedback and complete Assessments
* Assignment
  + Develop regression analysis to identify causes for Sustainability Index changes
  + Prepare 3-5 minute summary presentation
* Read
  + Gartner Magic Quadrant for Advanced Analytics Platforms 2016

### Week10 Big Data & Predictive Analytics

* Review
* Topic Presentation and Discussion
  + Technology
  + Statistical Thinking
  + Value Proposition
* Guest Speaker
  + Ralph Baker – Analytics Guru
* Practice
  + Present 3-5 minute regression analysis summary presentation
* Assignment
  + Case Study Project Overview
* Read
  + Gauge Your Data Warehouse Maturity Model

### Week11 Project Planning, ROI Calculation & Presentation Skills

* Review
* Topic Presentation and Discussion
  + Project Planning
  + ROI Calculation
  + Presentation Skills
* Assignment
  + Study (Client) Sustainability Program
  + Prepare questions for Assessment

### Week12 Sustainability Analytics Case Study – Assessments – IT/EDW

* Review
* Project
  + - Case Study Project – IT EDW Assessment Preparation
* Assignment
  + Schedule and interview IT EDW executives at targeted companies
    - Complete IT EDW Case Study Guide

### Week13 Sustainability Analytics Case Study – Assessments – Business Analytics

* Review
* Project
  + Case Study Project – Business Analytics Assessment Preparation
* Assignment
  + Schedule and interview Business executives at targeted companies
    - Complete Business Analytics Case Study Guide

### Thanksgiving Week Holiday – No Class

### Week14 Sustainability Analytics Case Study – Review and Follow up

* Review
* Project
  + Sustainability Analytics Assessment – Assessment Q&A
* Assignment
  + Schedule meetings with Business and/or IT EDW executives
    - Discuss and resolve questions to complete Sustainability Analytics Assessment Guide
  + Develop Sustainability Analytics Roadmap and Presentation

### Week15Sustainability Analytics Case Study – Presentations (to client)

* Case Study Client Presentations and Discussion
* Assignment
  + Complete and submit Sustainability Analytics Course Assessment

### DISABILITY SERVICES

Harvard Extension School is committed to providing an accessible academic community. The Disability Services Office offers a variety of accommodations and services to students with documented disabilities. Please visit [www.extension.harvard.edu/resources-policies/resources/disability-services-accessibility](https://exchange.clarku.edu/owa/redir.aspx?SURL=gP92CIttF2M4LUQHYo6j5nfHsqOAa4qKMqfi74_anjs-Xzp38InSCGgAdAB0AHAAOgAvAC8AdwB3AHcALgBlAHgAdABlAG4AcwBpAG8AbgAuAGgAYQByAHYAYQByAGQALgBlAGQAdQAvAHIAZQBzAG8AdQByAGMAZQBzAC0AcABvAGwAaQBjAGkAZQBzAC8AcgBlAHMAbwB1AHIAYwBlAHMALwBkAGkAcwBhAGIAaQBsAGkAdAB5AC0AcwBlAHIAdgBpAGMAZQBzAC0AYQBjAGMAZQBzAHMAaQBiAGkAbABpAHQAeQA.&URL=http%3a%2f%2fwww.extension.harvard.edu%2fresources-policies%2fresources%2fdisability-services-accessibility) for more information.

### ACADEMIC INTEGRITY

You are responsible for understanding Harvard Extension School policies on academic integrity ([www.extension.harvard.edu/resources-policies/student-conduct/academic-integrity](https://exchange.clarku.edu/owa/redir.aspx?SURL=8nm29MKR9ihitrWErtSXAwOsf8fMQWMGDHNxgXWGZ3vcnQob8InSCGgAdAB0AHAAOgAvAC8AdwB3AHcALgBlAHgAdABlAG4AcwBpAG8AbgAuAGgAYQByAHYAYQByAGQALgBlAGQAdQAvAHIAZQBzAG8AdQByAGMAZQBzAC0AcABvAGwAaQBjAGkAZQBzAC8AcwB0AHUAZABlAG4AdAAtAGMAbwBuAGQAdQBjAHQALwBhAGMAYQBkAGUAbQBpAGMALQBpAG4AdABlAGcAcgBpAHQAeQA.&URL=http%3a%2f%2fwww.extension.harvard.edu%2fresources-policies%2fstudent-conduct%2facademic-integrity)) and how to use sources responsibly. Not knowing the rules, misunderstanding the rules, running out of time, submitting "the wrong draft", or being overwhelmed with multiple demands are not acceptable excuses. There are no excuses for failure to uphold academic integrity. To support your learning about academic citation rules, please visit the Harvard Extension School Tips to Avoid Plagiarism ([www.extension.harvard.edu/resources-policies/resources/tips-avoid-plagiarism](https://exchange.clarku.edu/owa/redir.aspx?SURL=cRpAisE7n7zZ2YwWG3ve1YNDb4eZudHm6Sv7mPBEdVfcnQob8InSCGgAdAB0AHAAOgAvAC8AdwB3AHcALgBlAHgAdABlAG4AcwBpAG8AbgAuAGgAYQByAHYAYQByAGQALgBlAGQAdQAvAHIAZQBzAG8AdQByAGMAZQBzAC0AcABvAGwAaQBjAGkAZQBzAC8AcgBlAHMAbwB1AHIAYwBlAHMALwB0AGkAcABzAC0AYQB2AG8AaQBkAC0AcABsAGEAZwBpAGEAcgBpAHMAbQA.&URL=http%3a%2f%2fwww.extension.harvard.edu%2fresources-policies%2fresources%2ftips-avoid-plagiarism)), where you'll find links to the Harvard Guide to Using Sources and two, free, online 15-minute tutorials to test your knowledge of academic citation policy. The tutorials are anonymous open-learning tools.

### REGISTRATION INFORMATION

You may register for this course by logging on the Harvard Extension School Web Site: <http://www.extension.harvard.edu/registration>

### READINGS

### Gartner Magic Quadrant for Business Intelligence and Analytics Platforms

### *Gartner Magic Quadrant for Advanced Analytics Platforms*

*The Data Warehouse Lifecycle Toolkit: Expert Methods for Designing, Developing and Deploying Data Warehouses* by Ralph Kimball, Laura Reeves, Margy Ross and Warren Thornthwaite, Wiley, 1998 | ISBN 0-471-25547-5

*What Do Data Analysts Most Need from Their Tools?* By Stephen Few, Visual Business Intelligence Newsletter April/May/June 2015

*The Talent Dividend*, MIT Sloan Management Review Research Report by Sam Ransbotham, David Kiron and Pamela Kirk Prentice, Spring 2015

*Signal: Understanding What Matters in a World of Noise* by Stephen Few

### VISUAL ANALYTICS – DASHBOARD DESIGN CONTEST

After learning about foundation Analytics architectures, processes and best practices, students will be asked to develop sustainability dashboards, using industry-leading Analtyics technology tools provided during the course, to present key sustainability performance indicators and tell a story about how sustainability initiatives are or are not making and difference.

### PROJECT – SUSTAINABILITY ANALTYICS GUIDED ASSESSMENT

To apply what will be learned about Sustainability Analytics and to test critical thinking skills, students will conduct a Sustainability Analytics (Guided) Assessment to identify how analtyics are being used to support strategic sustainability initiatives.

Instructor McDonald will schedule a series of onsite meetings with Boston-area organizations for the students to explore and understand how analytics are used in today’s real world of business, to include learning about analytics architectures, understanding how analytics technologies are used within and across various business user communities, and gaining insight into analytics achievements and challenges.

At the conclusion of the project, students will develop the following documents:

* Sustainability Analytics Assessments
* Sustainability Analytics Roadmap
* Sustainability Analtyics Return on Investment (ROI) Model

This Project will provide the business knowledge and context to help students understand how analytics contributes to an organization’s success, as well as their success.

### REFLECTIONS

As described above, the project work; i.e., the development of a Sustainability Analytics Assessment for a client, is a substantial component of the learning experience in the course. To enhance and measure achievement of the learning objectives and skill development, reflection by the students at appropriate points during the semester is essential.

Reflection allows students to synthesize the experiences from client interaction, project activities and connect the new knowledge with the formal knowledge obtained from classroom activities and materials. To reflect means to think critically about and analyze emotional responses to activities in the context of course content and the learning objectives. Reflection can promote; interpersonal communication, problem solving skills, self-awareness, a sense of professional responsibility, and a sense of belonging. The process and questions for reflection are provided in addendum A.

Reference: <http://www.csuci.edu/servicelearning/Reflection.htm>

### GRADING

Below is a summary of the requirements and grade allocations:

Class Preparation and Contribution 20%

Assignment Completion and Discussions 20%

Test and Assessment Scores 30%

Project Solution Content and Presentation 30%

### TECHNOLOGY REQUIREMENTS

Students are required to bring a laptop computer to class with a Windows 7 or above operating system and Microsoft Office 13 Excel, Word and PowerPoint for hands-on activities.

### CLASS INFORMATION

The class will meet on Thursdays from 5:30 PM to 7:30 PM as indicated in the course schedule above. Please see the course website for updated classroom information. Course information is posted on the class website and will be updated throughout the semester. The course website (tbd)

### INSTRUCTOR

Art McDonald is the instructor; profile available at [www.linkedin.com/in/ArtMcDonald](http://www.linkedin.com/in/ArtMcDonald)

Sustainability Analytics Assessment

# Summary

The Sustainability Analytics Assessment (Assessment) is the final exam for Harvard University Extension School (HES) M.S. Stainability students. The Assessment goal is to provide students with a real world understanding of how reporting and analytics are used by organizations to sustainably maximize productivity, manage expenses and minimize environmental impact, while providing clients with a fresh perspective on their analytics capabilities and high value analytics deliverables.

# Sustainability Analytics Assessment

The Assessment is envisioned as a series of presentations from and discussions with enterprise, IT and sustainability executives and analytics specialists to define and profile analytics tools, processes and resources, so students can understand real world challenges and achievements, and to identify any potential opportunities for improving sustainability analytics business value for the client.

## Executive Vision

To understand how the organization views analytics’ value, opportunities and challenges, a brief discussion with the CEO, COO and/or Sustainability Executive is requested, to understand:

**Vision and Mission** – Why does the organization exists and what are its goals?

**Strategic Objectives** – What are current organizational objectives?

**Strategic Initiatives** – What are the programs in place to achieve those objectives?

**Metrics** – What are the metrics that measure the achievement of strategic initiatives?

## Information Technology Analytics Infrastructure

To understand how the Information Technology (IT) organization manages the business analytics technologies and processes, as well as serving and supporting business units’ reporting and analytics needs, discussions with the CIO, Data Warehouse Architect/Lead and the Business Analytics Lead is requested, to understand:

**Data Sources** – Where does data used for reporting and to measure achievement originate?

**ETL** – How are various data sources imported and integrated to measure achievement?

**Data Modeling** – How is data organized from integration to access for reporting and analytics?

**Data Governance** – Is there a process to translate disparate data sources into standard terms?

**Security and Administration** – How is data secured, backed up and maintained?

## Business Insights

To understand how business units access and explore information, as well as develop and deploy reports, discussions with executives and their business and data analysts in Finance, Sales, Marketing, HR, and other major business units are requested, to understand:

**Resources** – Can employees access, explore, analyze and make data-based decisions?

**Analytics Tools** – What are the reporting and analytics tools used in the organization?

**Analytics Libraries** – How do business user groups organize and maintain their reports?

Clients will be presented with an Assessment Summary at the conclusion.

**Addendum A: Reflection - Assignments, Process and Questions**

To be effective, it is important that proper reflection occur at specific stages during the semester. Below are the questions which you are asked to reflect upon and answer per the course schedule. Please consider the questions, document your thoughts and upload the assignment.

**Reflection #1 - Questions for the beginning of the Project:**

* Describe your sustainability analytics project. Include a brief description of the organization you will be working with; i.e., What is their purpose? How big are they? What is their history? What is their mission? What are their goals?
* How is your client addressing the needs?
* Why is your team needed?
* What are some of your perceptions or beliefs about the client you will be serving?
* What concerns, if any, do you have about working with your team?
* What concerns, if any, do you have about working with the client?
* What do you hope to gain from this experience?

**Reflection #2 - Questions during the Project:**

* How does your project experience relate to the learning objectives of the course?
* What did you accomplish with your client since the last reflection discussion?
* What did you observe?
* What did you learn about working with a team?
* What has worked? What hasn't?
* How is your project experience related to the readings, cases, guest speakers, discussions, and lectures in class?
* What do you think is (will be) the most valuable service your team can offer to your client?
* Is there something more you could do to contribute your team and to the solutions?

**Reflection #3 - Questions at the end of the Project:**

* What have you learned about yourself?
* What have you learned about your client?
* What have you contributed to the client?
* What have you contributed to your team?
* What values, opinions, beliefs have changed?
* What was the most important lesson learned?
* What new skills have you developed since the beginning of the project?
* How does the project experience connect to your long-term goals?
* How have you been challenged?

What characteristics make a corporation/non-profit/community successful in terms of sustainability analytics?

**Addendum B: Analytics Executive Assessment**

This assessment seeks your opinion about the information presented by the Analytics Executive and the value of that information to you.

**Analytics Executive**: **Date**:

**Topic:**

**What did you learn?**

**What did you like most?**

**What could have been done differently to make if more effective?**

**How would you rate the speaker?**

(circle one)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Excellent | Good | Fair | Poor | Not effective |
| 5 | 4 | 3 | 2 | 1 |

**Other Comments?**

**Addendum C: Analytics Technology Vendor Assessment**

This assessment seeks your opinion about the information presented by the Analytics Technology Vendor and the value of that information to you.

**Analytics Tech Vendor**: **Date**:

**Product:**

**What did you learn?**

**What did you like most?**

**What could have been done differently to make if more effective?**

**How would you rate the session?**

(circle one)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Excellent | Good | Fair | Poor | Not effective |
| 5 | 4 | 3 | 2 | 1 |

**Other Comments?**

**Addendum D: Project Team Evaluations**

This evaluation seeks your opinions about the level of contribution that you and the other team members on your team have made to your Final Project.

Please answer the questions by circling or bolding the number that most closely matches your assessment. Please note that this evaluation is entirely confidential. It must be hand delivered to the professor.

**Scale**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Excellent | Good | Fair | Poor | Not responsible at all |
| 5 | 4 | 3 | 2 | 1 |

(Your Name)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_

Communication 5 4 3 2 1

Leadership 5 4 3 2 1

Quality of Work 5 4 3 2 1

Timeliness for Meetings 5 4 3 2 1

Completing work on time 5 4 3 2 1

Provide feedback for other’s work 5 4 3 2 1

Respect for other’s opinion 5 4 3 2 1

Overall 5 4 3 2 1

Team member participation:

(Team member)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_

Communication 5 4 3 2 1

Leadership 5 4 3 2 1

Quality of Work 5 4 3 2 1

Timeliness for Meetings 5 4 3 2 1

Completing work on time 5 4 3 2 1

Provide feedback for other’s work 5 4 3 2 1

Respect for other’s opinion 5 4 3 2 1

Overall 5 4 3 2 1

(Team member)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_

Communication 5 4 3 2 1

Leadership 5 4 3 2 1

Quality of Work 5 4 3 2 1

Timeliness for Meetings 5 4 3 2 1

Completing work on time 5 4 3 2 1

Provide feedback for other’s work 5 4 3 2 1

Respect for other’s opinion 5 4 3 2 1

Overall 5 4 3 2 1

Additional Comments:

**Addendum E: Course Learning Assessment**

This assessment seeks your opinions about the quality and effectiveness of this course.

**What are the key knowledge and skills you gained?**

**Knowledge**

**Skills**

**What was most important/memorable?**

**What was least important/memorable?**

**What could have been done differently to make if more effective?**

**How would you rate the course?** (circle one)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Excellent | Good | Fair | Poor | Not effective |
| 5 | 4 | 3 | 2 | 1 |

**Other Comments?**