1. **Course Description:**

There was a time when sustainability was looked upon as a form of green washing. Over the last decade, it has evolved significantly to denote *environmental, social, and governance issues* that are fundamental to how successful businesses function and improve their long-term value. In today's challenging economic conditions, companies are under increasing pressure from governments, stakeholders, and the public to cut costs, to run leaner, more efficient and (both socially and environmentally) responsible organizations. These are perfect conditions for running a sustainable organization. That's why more and more companies are integrating sustainability into their operations. For example, a recent survey by MIT Sloan Management Review and the Boston Consulting Group conducted among managers and executives around the world, reported that 70% of organizations stated that sustainability has a permanent place on the management agenda.

But what makes a company sustainable? The best known definition of Sustainable Enterprise comes from The Brundtland Report. This United Nations sponsored report defines sustainability as "*forms of progress that meet the needs of the present without compromising the ability of future generations to meet their needs.*" Over time, to describe its multi-dimensional character a useful framework called *Triple Bottom Line* that encompasses *economic, social, and environmental factors* has been developed. A sustainable business is a business that strives to meet the triple bottom line. And operations management is at the core of any sustainable enterprise.

In this course, the main question we address is “**How can sustainability initiatives drive business performance?**” In the first part of this course, we take a holistic view of the interaction
between businesses, environment and society. Through a simulation game, we introduce how an industry may fall victim to the "tragedy of the commons" in which failure to coordinate leads to the depletion of a scarce resource. In the rest of the course, we address sustainable operations with respect to four main decision areas in operations:

i. **Improvement**: You cannot improve what you cannot measure. We first learn how to measure the environmental and social impact of products and processes using Life Cycle Analysis (LCA). We then use LCA results to discuss opportunities for improvement.

ii. **Planning and Control**: In the second part, we identify the linkage between lean and green and discuss planning and control of processes to minimize waste as well as materials and energy consumption.

iii. **Design**: Next, we introduce the product stewardship concept and focus on topics such as product design for sustainability, recycling, remanufacturing, and reuse.

iv. **Strategy**: Last part is devoted to building a sustainable operations strategy. In particular, we discuss strategies for complying with environmental and social regulations, new business models such as servicization, sustainable supply chain management practices and associated risks and opportunities.

Overall, this course outlines the reasons why businesses should care about sustainability issues, and introduces tools to identify opportunities and risks related to sustainability.

**1.1. Who would benefit from this course?**

In the job market, positions tied to sustainability appear to be a bright spot. In the past two years, the number of job postings containing the keyword "sustainability" has more than quadrupled (Indeed.com).

Yet, you do not need to work on sustainability per se to benefit from this course. **Have you ever wondered what you need to know about sustainability as a business leader? If your answer is yes, then this course is for you.** If you have not, in this course you will see why you should indeed care about how businesses perform in the area of sustainability.

**1.2. Course Objectives**

At the end of the course, you should be able to:

- Analyze product and process performance through life-cycle thinking
- Identify opportunities for cost reduction via sustainability initiatives
- Compare and contrast alternative ways of complying with environmental and social regulations
- Explain various product stewardship practices
- Compare and contrast traditional supply chain with closed-loop supply chain
- Summarize opportunities and constraints in sustainable supply chain design and operation
2. **Class Structure:**

Classes will be a mixture of lectures, case discussions, simulations, and activities/exercises. As discussions will involve active learning by students, **it is important to have read the assigned material/case before class.**

2.1. Books and Materials

There is no required textbook for this course, but below is a partial list of reference books and popular sustainability books (in alphabetical order) that we will draw on in class. Cases will be included in the course pack. Further required and optional readings are listed in Section 5.


2.2. Course Web Site

Course web site on Carmen will contain course materials, slides, handouts, etc. Any changes to the syllabus or schedule as well as any other important course announcements will appear there. You should check Carmen regularly. Also, the web site will have information regarding your grades in the course.

2.3. Getting Help

Office hours are TBA. Because everyone has complex schedules, I understand if you cannot make it during office hours. I am available to discuss any issues of concern with you on an individual basis by appointment. If you have an issue you would like to discuss, please e-mail me to request an appointment.
3. **Course Requirements and Grading:**

Your grade will be determined as indicated below.

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<th>Individual</th>
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<tbody>
<tr>
<td>Case Write-ups</td>
<td>Individual</td>
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<td>Final Project - Report</td>
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Every student should place the following statement on all work submitted for evaluation and sign: “In accordance with the University’s code of student conduct, I attest that I have not engaged in any acts of plagiarism in completing this assignment.” Students (all the students in the group if it is a group work) are asked to sign this statement before submitting their work for evaluation. Note that I use Turnitin software on Carmen to evaluate the originality of submissions.

### 3.1. Case Write-ups

There are seven case write-ups. Each student needs to submit an individual report. Please write your text in Times New Roman, Calibri or Cambria 12pt, use 1.15 line spacing, justify paragraph margins, and print double-sided. These reports should be 1-2 page long and in question-answer format (See Section 6 for questions). Answer the questions in your own words, i.e., do not copy and paste text from the case. Use the case write-up template posted on Carmen. For each student, the overall case write-up grade will consist of her/his top 6 scores (i.e., your lowest score will be dropped).

A **hard copy of the case write-up is due at the beginning of the class** (see Section 5 for Course Timeline). In addition, an electronic copy of case write-up should be uploaded to Dropbox on Carmen by **6 PM on the due date**. Late submission will lose 3% of the grade for every minute past submission deadline. E-mail submissions are not acceptable. The final solution turned in must reflect work done by the student whose name is on the submission. Electronic and hard copies of your submission should be exactly the same.

When you turn in case write-up, this means that you are prepared to discuss the case. When I pose a question, if no one volunteers an answer, I reserve the right to randomly select a write-up among submissions and expect an answer from that student.

### 3.2. Active Participation
Attending class alone is not enough: attendance does not equal participation. Students who consistently answer questions, ask interesting questions or contribute good ideas to class discussion can expect to receive between 10 and 20 points; depending on the quality of participation. Remember, quality is more important than quantity. On the other hand regular class attendance is also valuable. Therefore, students who attend all classes, and maintain a professional attitude (details are provided in Sections 4.1-4.3), but do not participate actively, can expect to receive around 10 points. Students whose classroom activities would be distracting to others (see Sections 4.1-4.3) will receive 0 points.

3.3. Final Project

For the course project, you will work in groups of three. You have two options:

OPTION 1: Choose one of the following business models.

1. Car2Go, a shareable goods (or services) provider.

2. TerraPass, a carbon offset retailer.

3. ITC e-Choupal, an initiative to link farmers with ITC directly, eliminating middlemen.

4. SunEdison, providing Power Purchase Agreement (PPA) solutions

5. Better Place, battery-charging and battery-switching services provider (bankrupted, answer the questions considering the time company was active).

Answer the following questions:

1. Who are the competitors of the company (if any)? Who are the potential collaborators?

2. What are the potential environmental and social impacts?

3. What risks do you see for this business model?

4. Compare different strategies (e.g., in terms of pricing, new member incentives and availability of products/services offered) for the firm. What are the key success factors?

5. Discuss how the current and projected regulatory framework would affect the company, if at all. Make recommendations to address these challenges or to implement opportunities.

6. What are the other industries where you would recommend implementing similar business concepts? What risks do you see?

OPTION 2: First identify an industry or company that you are interested in. You are expected to provide an analysis of the major sustainability issues for the industry/company of your interest.

Prepare the analysis for a high level stakeholder in mind. That could be a regulatory agency for an industry, the CEO of a firm, or a non-profit organization. Your report should summarize the existing strategies and challenges, and recommend a particular opportunity/strategy to pursue in the industry.
The final report should include analysis, figures, illustrations, flowcharts, etc. that you find appropriate. You are encouraged to use publicly available information such as corporate sustainability reports or available databases. You may use the following as guidelines when conducting your analysis:

1. Who are the competitors (if any)? Who are the potential collaborators?
2. Identify some of the sustainability issues in the industry. What are the potential environmental and social impacts?
3. Identify some of the challenges/opportunities related to sustainability issues. What risks do you see for this industry/company?
4. Compare different strategies in the industry (or, for the company). What are the key success factors?
5. Discuss how the current and projected regulatory framework (e.g., carbon taxes/pricing, take-back regulation, etc.) would affect the industry/company. Make recommendations to address these challenges or to implement opportunities.
6. What are the other industries where you would recommend implementing similar business models? What risks do you see?

No more than one group is allowed to work on the same firm. I suggest you make your choice fast. The general rule 'first come, first served' applies. As soon as you decide on your project topic, you should e-mail me. I will keep an updated list of selected projects on Carmen homepage.

**Deliverables:** Regardless of your choice (Option 1 or 2), there are four deliverables associated with your course project:

1. One page mid-term report due on April 3rd (Friday) by midnight that clearly states your project topic, shows your progress so far, and presents a timeline for the rest of the term. Upload your report to Dropbox on Carmen. No need for hard copies.
2. An in-class presentation in one of the last two sessions. We will determine which group will present in which session randomly. You will have a chance to evaluate each other's presentation.
3. **A written final report (due TBA).** Upload your report to Dropbox on Carmen and submit a hard copy of your report by the due date. Your report should be in essay format (not in question/answer format) and include any analysis you carry out to justify your answers.
4. Individual peer evaluations from each group member. Individual grades will be assigned based on your relative contribution to the group's work. If you do not submit your peer evaluation form, it is assumed that you have assigned a rating of (100/x)%, where x is the total number of students in the group, to each one of your group members. The evaluation forms can be submitted in person or via e-mail.

Late submission will lose 3% of the grade for every minute past submission deadline. E-mail submissions are not acceptable. The final solution turned in must reflect work done by the students.
whose names are on the submission. Electronic and hard copies of your submission should be exactly the same.

**Format of the final project report:** Please write your report in Times New Roman, Calibri or Cambria 12pt. Use 1.5 line spacing and justify paragraph margins. There are no restrictions on report length, but it should be professional, and include an executive summary. You may also choose to deliver other supporting material (spreadsheets, etc.). In that case, any supporting material should be uploaded to the Dropbox in Carmen. Document and support all your statements and suggestions with facts. Please provide proper citations for any outside materials used to avoid accidental plagiarism.

**Grading of the final project:** For the final group project, your grade will be based on the breadth and depth of research (the quantity and quality of material you present regarding your topic), quality of analysis, and quality of writing (including proper citations). In grading group work, I will solicit peer evaluations from all group members, and will assign individual grades based on your relative contribution to the group's work.

3.4. Final Exam

Final exam consists of multiple choice, short essays, and problems. It is comprehensive but open notes. Make-up, early, or late exams will NOT be given, except in very extreme circumstances. More information on the final exam will be provided in class.

3.5. Grade Appeal Policy

Grades are intended to reflect the overall quality of performance of the student(s). I carefully grade the project/case reports/exams, and am as consistent in giving partial credit where applicable. If you think your grade does not reflect the quality of your performance, submit a clear written explanation via e-mail with your reasoning within one week after the return and review of your project/case reports/exams. The written document need not be long, but must clearly identify the problem or issue of concern. I will consider all such appeals. There will be no grading appeals after the one-week deadline has passed.

4. Other Rules:

4.1. Academic Misconduct

Material submitted for course grade credit must be your own work. Please be informed that both you and I must follow Faculty Rule 3335-5-54, which requires that “all instances of what he or she believes may be academic misconduct” be reported to the University Academic Misconduct Committee. You can view the University's code of student conduct at:

Academic misconduct is a serious threat to the integrity and value of your diploma. The main concern for this class is cheating and plagiarism on project/assignments/case reports/final exam.

4.2. Attendance Policy

Fisher College of Business expects MBA students to attend all classes. You are expected to arrive in class at least a couple of minutes prior to class and stay through the entire session. As a courtesy to your fellow classmates and instructor, please notify me in advance of any class that you must come late for a class or leave a class early. Absence will result in a failing grade for participation in that session. No more than two absences will be considered acceptable in this course.

4.3. Gadget Policy

As a courtesy to your fellow classmates and instructor, please turn off your cell phones and all other noise-making devices. Use your laptop for course-related activities, i.e., to take notes, follow along with slides, accessing this course’s webpage, playing in-class simulation games. It is not allowed to use laptops or iPads in class for texting your sweetheart, sending e-mails, reading the news, doing your finance homework, etc. Breaking gadget policy is a sign of unprofessional behavior and it will affect your participation score.

4.4. Disability Accommodation

If you need an accommodation based on the impact of a disability, arrange an appointment with me as soon as possible. I rely on the Office for Disability Services for assistance in verifying need and developing accommodation strategies. You should start the verification process as soon as possible.

4.5. Inclement Weather

If school is open, class will be held. If school is closed, classes will be cancelled. Use your judgment on whether you choose to attend if the weather makes travel problematic and school is open.
5. **Course Schedule**

**Week 1:**

**Class 1:** Introduction to Sustainable Operations  
**Required Reading:** Syllabus

**Class 2:** *Simulation Game: Fishbanks*  
**Required Reading:** Fishbanks Simulation Game Instructions (Posted on Carmen)

**Week 2:**

**Class 1:** Fishbanks Simulation Game - Debrief  
**Life Cycle Analysis**

**Optional Readings:**
- Hardin, G. (1968), Tragedy of the Commons, Science, 162, 1243-1248  
- Life cycle Assessment: Principles and Practice by Scientific Applications International Corporation (SAIC) EPA/600/R-06/060 Available at: http://www.epa.gov/nrmrl/std/lca/lca.html  

**Class 2:** Lean and Green Operations  
**Eco-effectiveness**

**Assignment:** Case write-up – Polyface: The Farm of Many Faces

**Optional Readings:**
- Lean and Environment Toolkit by EPA Available at: http://www.epa.gov/lean/environment/toolkits/environment/index.htm  

**Week 3:**

**Class 1:** Design for Sustainability  
**Assignment:** Case write-up – Rohner Textiles: Cradle to Cradle Innovation and Sustainability

**Optional Readings:**

**Class 2:** Closed-Loop Operations: Remanufacturing, Recycling, and Reuse

**Optional Readings:**

**WEEK 4:**

**CLASS 1:** Closed-Loop Operations: Remanufacturing, Recycling, and Reuse  
**ASSIGNMENT:** Case write-up – Managing Product Returns at HP

**CLASS 2:** Servicization  
**ASSIGNMENT:** Case write-up – Interface’s Evergreen Services Agreement  
**OPTIONAL READINGS:**  

**WEEK 5:**

**CLASS 1:** Environmental Regulations and Operations  
**ASSIGNMENT:** Case write-up – The ERP: Promoting competition in e-waste recycling  
**OPTIONAL READINGS:**  

**CLASS 2:** Simulation Game: Cap and Trade  
**REQUIRED READING:** Cap and Trade Simulation Game Instructions (Posted on Carmen)

**WEEK 6:**

**CLASS 1:** Sustainability in Supply Chain Management  
**ASSIGNMENT:** Case write-up – Walmart’s Sustainability Strategy  
**OPTIONAL READINGS:**  

**CLASS 2:** Evaluating Risks and Opportunities of Sustainability Strategies  
**ASSIGNMENT:** Case write-up – Fiji Water: Carbon Negative?

**WEEK 7:**

**CLASS 1:** Project Presentations  
**CLASS 2:** Review/ Project Presentations
6. Questions for Case Write-ups

Polyface: The Farm of Many Faces (HBS 9-611-001)

1. Reflect on the differences between the operating systems of Polyface and the industrial model of food production. How would you characterize the key differences between the two?
2. What are the challenges of managing and growing economies of scale and economies of scope operations?
3. How would you measure the productivity of Polyface Farm?

Rohner Textiles: Cradle to Cradle Innovation and Sustainability (UVA-ENT-0085)

1. Why did Rohner Textile undertake this strategic environmental initiative?
2. What is your assessment of how Rohner Textile handled the hurdles in the design process?
3. Does it make sense to offer the patented technology to the industry?

Managing Product Returns at HP (ECCH 602-039-1)

1. Why do customers return printers and what can we do to reduce returns?
2. How does HP manage the returns process from the consumer to the remanufacturing sites?
3. Does it make sense to engage in remanufacturing related activities?
4. How do we market remanufactured products?

Interface’s Evergreen Services Agreement (HBS 9-603-112)

1. What is rationale for “licensing products of service”?
2. What is Anderson’s vision for the Evergreen Services Agreement? What is your assessment of the business model? Why are potential customers interested by this proposal?
3. Why is Interface finding it difficult to sell Evergreen Services Agreements? What is your assessment of the negotiations with University of Texas at Houston? Why did they break down? Under what circumstances might they succeed?
4. What do you think Hendrix should do?

The European Recycling Platform: Promoting Competition in E-Waste Recycling (Stanford GS-67)

1. What were the deficiencies of the national consortium model for recycling, such as the Green Dot System?
2. What were the driving values of the ERP model? In what ways did they address the deficiencies of the national consortium / Green Dot model?
3. Should ERP expand its scope?
WALMART’S SUSTAINABILITY STRATEGY (STANFORD OIT-71)

1. How is Walmart deriving business value from its sustainability strategy?
2. Imagine that you are Andy Reuben or Tyler Elm, evaluating the progress of the electronics, seafood, and textiles networks. Which networks have been most successful? What factors explain the successes (or lack of successes) of these networks?
3. How is Wal-Mart motivating its suppliers to share information about and continuously reduce the environmental impacts of products and processes? How can the company stimulate the development of breakthrough innovations?
4. Propose one new “game changer” or “innovation project” not described in the case, for any of the networks. To support your proposal, outline the environmental benefits, the profit opportunity for Wal-Mart, the greatest challenges to implementation, and how Wal-Mart could overcome them.

FIJI WATER: CARBON NEGATIVE? (HBS 9-611-049)

1. When the Resnicks acquired FIJI Water in 2005, the bottled water industry was very crowded. Yet, FIJI Water soon became the bestselling imported bottled water in the United States. What accounts for FIJI Water’s success?
2. What is greenwashing, and why do companies engage in greenwashing? How do you know when a claim is greenwashing?
3. In light of the lawsuit, what should FIJI Water do? Should it amend its carbon negative strategy?
4. Suppose FIJI Water hired you to develop a negotiation strategy to use with the Fijian government. What strategy would you recommend?