Course Syllabus

Course Information

Course Prefix, Number, Section	ITSS 4v95.003
Course Title	Harnessing AI for a Sustainable Future
Term	Spring 2026 (January 20, 2026 – May 8, 2026) Credit Hours: 3
Days & Times	Thursdays, 4 p.m. - 6:45 p.m.
Room Location	JSOM 11.210

Instructor Contact Information

Instructor	Geeta Menon
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Office Hours	By appointment
Other Information	Geeta Menon's LinkedIn Page

Instructor Bio

Geeta Menon is an experienced senior executive and educator who is serving as a faculty for Sustainability at the Naveen Jindal School of Management, University of Texas at Dallas. She's also the founder of Over two decades, Geeta held leadership roles at major companies such as SAP, Dell and Accenture, building enterprise software for e-commerce, cybersecurity and AI. In 2024, she pivoted toward integrating ESG and emerging tech into business education at UTD. She also launched One Earth One Chance, an environmental nonprofit, reinforcing her commitment to sustainable practices. One Earth One Chance has expanded urban forests with 7,400 native trees and plants, restored habitats and spread awareness through 148+ community events.

She advocates for thought leadership in sustainability by facilitating curricula, workshops, entrepreneurship competitions, industry-university panels, and speaking engagements. She's uniquely positioned to bridge industry and academia by bringing real-world AI implementations—such as intelligent supply chain, energy-efficiency modeling, emissions forecasting and carbon-tracking —into academic discourse.

Course Pre-requisites, Co-requisites, and/or Other Restrictions

May be repeated for credit as topics vary (9 semester credit hours maximum). Instructor consent required.

Course Description

This undergraduate course is designed to equip learners with a comprehensive understanding of environmental, social, and governance (ESG) principles and a practical mastery of applying generative Artificial Intelligence (AI) technologies to enhance ESG practices. This course explores how AI can solve real-world sustainability challenges in sectors like energy, transportation, agriculture, manufacturing, and construction, and more. It investigates how AI can shape the future by considering its role in the evolution of smart cities and the future of work as we journey to 2050. It's perfect for students who want to stand out in a tech-driven world, and develop the knowledge and skills to implement AI solutions that drive meaningful sustainable impact, all while navigating the complex ethical and practical challenges of this emerging field.

Student Learning Objectives/Outcomes

At the end of this course, students are expected to:

- Master fundamental ESG concepts, standards, and reporting frameworks

- Identify the capabilities and limitations of generative AI (GenAI) and large language models
- Apply GenAI techniques to extract, analyze, and validate ESG data from sustainability reports (including Scope 1, 2, and 3 emissions)
- Navigate the regulatory landscape, ethical considerations, data privacy concerns, and bias in AI-driven ESG practices
- Develop knowledge through experiential learning where students connect theory to real-world applications, consider insights from industry speakers and build a startup pitch.

Required Textbooks and Materials

No specific textbook is required for this course. All essential materials will be provided within the course modules through lecture videos, slides, and carefully curated reading materials. These include selected industry reports, academic papers, regulatory guidelines, and technical documentation that complement the course content. Additional optional readings will be suggested throughout the course for those interested in deeper exploration of specific topics. All required readings will be made available directly through the course platform. Each module may include several suggested readings.

Academic Calendar

Module	Description	Activity
1 1/20 – 1/25	**Fundamentals of Using GenAI in ESG** Start with ESG and GenAI fundamentals before exploring their intersection. ● Define ESG and explain its importance in the context of sustainable business practices ● Identify key AI technologies enabling ESG transformation and their applications in different sectors. ● Define generative AI (GenAI) and differentiate it from traditional AI approaches ● Understand the types of generative models and their capabilities, with a focus on large language models (LLMs) ● Recognize the scale and impact of modern LLMs and appreciate their potential for transforming various industries ● Compare and evaluate key players and emerging players in the GenAI landscape ● Understand ongoing research areas and the path towards Artificial General Intelligence (AGI) and predict the short-term and long-term future of GenAI and its potential implications for society ● How AI can accelerate progress on sustainable development goals (SDGs). ● Master prompt engineering techniques to guide GenAI models towards producing accurate and relevant outputs ● Understand the similarities and differences between various AI implementation approaches, such as RAG, fine-tuning, and prompt engineering, for different ESG use cases. ● Industry speaker Tools: Copilot in MS Sustainability Manager uses AI to give organizations the ability to streamline and expedite several processes with the sustainability lifecycle.	In-class Assignment Case Exercise

Module	Description	Activity
2 1/26 – 2/1	**AI-powered Circular Economy and Waste Management** ● Waste management: AI can enhance waste sorting and recycling efficiency with robotics and computer vision, identify materials, and predict maintenance needs for recycling equipment. ● AI supports the circular economy by helping to design products for longer lifecycles and recyclability.	Quiz 1 - due on 2/4 by 11:59 pm
3 2/2 – 2/8	**Accelerating Sustainable Agriculture** ● AI-powered precision farming uses data to optimize water, fertilizer, and pesticide use, through data analysis to increase crop yields, reduce waste, and minimize chemical runoff, leading to more resilient food systems. **Peer Learning Project (PLP) Assignment #1: AI for Sustainability Startup Business Plan (Initial Draft)** ● Executive Summary: Provide a concise overview of your business, including its mission, goals, and key strategies. ● Company Description: Elaborate on your business concept and mission statement. ● Market Analysis: Research your target audience, identify competitors, and analyze market trends. **The role of AI in Reducing Food Waste** ● Businesses are harnessing AI to reduce food waste, a common issue in the hospitality industry, and solve the global food security challenge.	Assignment #1 – due on 2/11 by 11:59 pm
4 2/9 – 2/15	**Reshaping Manufacturing, Supply Chain and Logistics** ● Increasing transparency of supply chains with AI and satellite data ● Predictive Maintenance: Use AI to forecast equipment failures, minimize downtime, reduce operational waste, and extend the lifespan of machinery. ● Material Science and Sustainable Product Design: Accelerating the discovery and development of new, high carbon-absorbing or less resource-intensive materials. ● Reducing Defective Production: Utilizing computer vision in manufacturing to identify defects early, reducing waste and the carbon emissions associated with returns and rework. ● Supply chains: AI optimizes inventory, logistics and transportation routes to reduce waste and fuel consumption, track emissions, and ensure ethical sourcing of materials	Quiz #2 – due on 2/18 by 11:59 pm
5 2/16 – 2/22	**Uncovering Hidden Opportunities in Energy** ● Energy Optimization and Smart Grids: AI can help integrate renewable energy sources into the power grid more effectively by predicting generation and demand and balancing energy loads. ● Renewable Energy Forecasting: Improving the efficiency and reliability of wind and solar power generation by predicting weather patterns and output. ● Energy efficiency: Optimize energy consumption in buildings and data centers and help balance supply and demand on smart grids to reduce waste. **Peer Learning Project (PLP) Assignment #2** Use Copilot in MS Sustainability Manager to generate a Corporate Sustainability Reporting Directive (CSRD) report on greenhouse gas emissions, simplifying the existing reporting framework.	Assignment #2 – due on 2/25 by 11:59 pm

Module	Description	Activity
6 2/23 – 3/1	**Education and Workforce Development - Boosting Productivity with AI** ● Make efficient use of resources by automation of repetitive tasks, optimized production processes and data-driven decision making. ● Leverage predictive maintenance, demand forecasting, financial predictions and personalized customer experience. ● The future of work: augmenting human capabilities and enabling workers to focus on strategic and creative tasks.	Quiz #3 – due on 3/4 by 11:59 pm
7 3/2 – 3/8	**AI and Healthcare** ● The future of healthcare in the age of AI ● The promise of AI in improving wellness **Peer Learning Project (PLP) Assignment #3: AI for Sustainability Startup Business Plan (Second Draft)** ● Marketing and Sales Plan: Outline your strategies for reaching your target market and generating sales. ● Financial Plan: Detail your startup costs and revenue projections ● Operational Plan: Describe your management team, and day-to-day operations. ● Products and Services: Provide a detailed description of what you offer.	Assignment #3 – due on 3/11 by 11:59 pm
8 3/9 – 3/15	**Building Smart Cities and Smart Mobility** ● Smart cities: AI streamlines traffic flow to reduce congestion and emissions, and helps manage urban resources more efficiently. ● Analyze urban data to track air pollution in real-time, provide public health warnings, and inform policy-making. ● The Impact of AI on Transportation and Smart Mobility ● Managing energy use in commercial and residential buildings via AI-powered HVAC and lighting systems.	Quiz #4 – due on 3/18 by 11:59 pm
3/16 – 3/22	**Spring Break**	
9 3/23 – 3/29	**Finding Solutions for a Thirsty World** ● Water conservation: Monitor water usage, detect leaks in distribution networks, and optimize irrigation practices to conserve water resources, helping to manage decentralized water systems more efficiently. **Assignment #4** Create a calculation model using Copilot in MS Sustainability Manager to enable organizations to obtain insights into the total water withdrawn, consumed, and discharged across its facilities over a period of one year, using the intensity factor, e.g., gallons of water used per square foot.	Assignment #4 – due on 4/1 by 11:59 pm

Module	Description	Activity
10 3/30 – 4/5	**Environmental monitoring and conservation** ● Climate Change Modeling and Prediction: Enhance the accuracy of weather forecasting, and extreme weather event prediction to improve mitigation and adaptation strategies. ● Carbon capture: AI assists in optimizing carbon capture and sequestration (CCS) processes. ● Environmental monitoring: Analyze satellite imagery, sensor data, and drone footage to track deforestation, glacier melt, water quality, and air pollution in near real-time. ● Wildlife conservation: AI tools can identify species through images or sounds, monitor habitats, and help protect biodiversity. ● Disaster Preparedness: AI can improve forecasting and response to natural disasters. Provide early warning systems for floods or forest fires, helping communities prepare and respond more effectively. ● Industry speaker	In-class Assignment Case Exercise
11 4/6 – 4/12	**Green Finance** ● Financial institutions employ AI models to assess climate-related risks, guiding eco-friendly investment strategies. ● AI analytics streamline the process of issuing and managing green bonds, directing capital toward renewable energy for example. ● Fraud Detection and Credit Risk: AI systems monitor transactions in real-time to flag anomalies and detect fraudulent activities more effectively, preventing significant financial loss. Predictive analytics also helps in assessing credit risks with greater precision. ● Operational Automation: AI and GenAI agents automate repetitive, data-intensive tasks such as invoice processing and report generation. ● Personalized Customer Experience: AI enables the delivery of personalized financial recommendations and 24/7 customer service through intelligent chatbots and virtual assistants. ● Algorithmic Trading: AI-driven algorithms are fundamental to modern capital markets, enabling high-frequency trading and complex investment strategies by analyzing vast datasets and executing trades at speeds beyond human capability.	Quiz #5 – due on 4/15 by 11:59 pm

Module	Description	Activity
12 4/13 – 4/19	**Healthcare** ● Use AI in healthcare for optimized waste management and resource allocation, and for general public health and well-being initiatives tied to environmental factors like air quality. ● Diagnostics and Treatment: AI algorithms analyze vast amounts of data, including medical images to detect diseases earlier and with greater accuracy than human experts in many cases. ● Drug Discovery and Development: AI is accelerating the process of identifying high-potential drug candidates and simulating molecular interactions, reducing research timelines from years to months and saving millions in R&D costs. ● Administrative Efficiency: AI-powered tools such as medical scribes and natural language processing (NLP) automate administrative tasks like documentation, scheduling, and billing, freeing up clinicians to focus on direct patient care. ● Improved Access and Proactive Care: AI enables tools like virtual assistants and predictive models that can identify at-risk patients, allowing for proactive interventions and expanding access to care in underserved areas via telemedicine support.	Assignment #5 – due on 4/22 by 11:59 pm
13 4/20 – 4/26	**E-commerce** ● Personalization and handling customer inquiries. ● AI is used in sustainable e-commerce to optimize supply chains, reduce waste, and improve energy efficiency. ● AI is used for demand forecasting to cut overstock, optimizing delivery routes, using AI-powered chatbots to promote slower shipping options, and implementing smart packaging to minimize material usage. ● AI also enhances energy management in warehouses and data centers by optimizing usage and integrating renewable energy sources.	Quiz #6 – due on 4/29 by 11:59 pm
14 4/27 – 5/3	**AI for Green vs Green AI** ● Reflect on the benefits and challenges of using GenAI for automating ESG data extraction and analysis processes ● Detrimental consequences of AI in relation to environmental dimensions. ● Solutions to reduce the environmental footprint of AI drawing on case studies from industry. ● Recognize and analyze examples of greenwashing and its impact on ESG credibility ● Foster critical thinking about ethical implications. of AI for ESG. Identify and analyze ethical considerations in using AI for ESG, such as data privacy, algorithmic bias, and transparency.	Assignment #6 – due on 5/6 by 11:59 pm

Module	Description	Activity
15 5/4 – 5/10	**Reporting and Compliance** ● Recognize the challenges in ESG data collection and analysis and the need for AI-driven solutions. ● Explain the limitations of traditional ESG rating agencies and the benefits of using GenAI for automated ESG analysis ● Evaluate the role of regulatory bodies, such as the SEC, in shaping ESG disclosure requirements ● Understand the key ESG standards, frameworks, and reporting practices, such as GRI, SASB, and TCFD and AI specific regulations and reporting ● Use Natural Language Processing (NLP) and machine learning to collect, clean, and automate sustainability data for transparent reporting and regulatory compliance. ● Utilize GenAI for ESG risk assessment, and for improving stakeholder engagement and communication ● Understand and apply retrieval augmented generation (RAG) techniques to enhance GenAI models with up-to-date ESG information ● Fine-tune pre-trained GenAI models on specific ESG datasets to improve performance on sustainability-related tasks ● Through hands-on practice, you'll develop practical skills in applying GenAI techniques for ESG data analysis, risk assessment, and reporting. ● Apply GenAI techniques to extract and analyze Scope 1, 2, and 3 emissions data and other environmental information from sustainability reports ● Evaluate the accuracy and completeness of GenAI-extracted ESG data through manual verification and error analysis **In-class Assignment** Upload the following Sustainability reports and ask Copilot in MS Sustainability Manager questions about their contents and assessments. Provide a summary of your analysis. ● Microsoft: 2024 Environmental Sustainability Report ● BP: BP Sustainability Report 2024 **Case Exercise** Extracting Data from ESG Reports. Leverage Clarity AI, Benchmark Gensuite or Dayrize to integrate sustainable impact metrics and principal adverse impact (PAI) indicators into decision-making, reporting, compliance and risk management.	In-class Assignment Case Exercise
16 5/11 – 5/15	**The Road to 2050** ● Future trends in AI-driven sustainability. ● Understand the importance of explainable AI and its role in building trust and accountability in AI-driven ESG practices ● Discuss the current regulatory landscape and potential future developments in AI governance and ESG standardization ● Develop a forward-looking perspective on the opportunities and challenges of leveraging AI for driving sustainable impact and social good **Final Project: AI for Sustainability Startup Pitch** **Peer Learning Project (PLP) Assignment #4: AI for Sustainability Startup Business Plan (Presentation Pitch)**	Final Project

Grading Policy

Grading on a curve based on performance on quizzes, assignments and a final project. Students will be evaluated on the basis of three factors:

1. Their performance on six quizzes.
2. Their performance on nine assignments.
3. Their performance on a final project.

Final Project: 25% of grade
Assignments: 25% of grade
Each Quiz: 10% of grade

The base grading given below may be adjusted based upon the performance of the class as a whole:
A - 90% to 100%
B – 80% to 89%
C – 70% to 79%
D – 60% to 69%
Below 60% is failing.

Course Policies

Lectures

In each module, the concepts you need to know will be presented through a collection of lectures. eLearning will have videos and you may stream these videos for playback within the browser by clicking on their titles or downloading the videos. You may also download the slides that go along with the videos. Although class attendance is not mandatory, quizzes may be given, for which there is no makeup.

Assignments

There will be assignments that will require the student to spend time writing or using a computer outside of class. Assignments are due in class on the dates given. Late assignments will lose points, and after a week, no credit will be given.

Discussion

Some modules may include one discussion prompt. You will see the discussion prompt alongside other items in the lesson. Each prompt provides a space for you to respond.

Graded Quizzes

Each module will include at least 1 graded quiz. You will have one week to complete the quiz.

Practice Quizzes

Each module will include one practice quizzes, intended for you to assess your understanding of the topics. You will be allowed unlimited attempts at each practice quiz. There is no time limit on how long you take to complete each attempt at the quiz. These quizzes do not contribute toward your final score in the class.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course; however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Class Participation

Regular class participation is expected regardless of course modality. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Classroom Citizenship

Students are expected to maintain a respectful and professional learning environment by participating actively, acting with integrity, and treating others courteously.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Accommodations for Students with Disabilities

Please review the section within the UT Dallas Syllabus Policies and Procedures webpage.

Academic Support Resources

Please visit the Academic Support Resources page to view the University's academic support resources for all students.

UT Dallas Syllabus Policies and Procedures

Please visit the Syllabus Policies page to view the University's policies and procedures segment of the course syllabus.

Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.