Syllabus: MAN 4594 - Logistics and Sustainability

Spring Semester 2026

Course Information

- **Course Number and Title:** MAN 4594 – Logistics and Sustainability
- **Credit Hours:** 3 credits
- **Academic Term:** Spring 2026
- **Class Meetings:** Hybrid (Mondays on campus, room IST-1012, Wednesdays online, synchronous via Teams or asynchronous), 7-8:15 pm

Instructor Information

- **Instructor:** Dr. Beatriz Canamary
- **Office Location:** online
- **Office Hours:** by appointment only
- **Other Ways to Contact You:** bcanamary@floridapoly.edu

Course Delivery and Course Description

- **Delivery Mode:** This course will be delivered in a hybrid mode, with Mondays on campus in room IST-1012 and Wednesdays offered online, either synchronously via Teams or asynchronously. Please refer to the Canvas course website for all course information, including announcements, discussions, assignments, quizzes, and supplementary materials related to the topics covered in this course.
  Both sessions are required and essential for course success.

- **Official Catalog Course Description:** Students will gain expertise in leveraging data-driven insights to enhance and implement reverse logistics processes that support sustainable development goals; reverse logistics referring to the movement of goods from the customer back to the seller. This course integrates mathematical optimization, cost analysis, predictive analytics, and quantitative environmental assessments, enabling a comprehensive approach to sustainable business practices. Students will emerge with the capability to not only analyze and improve existing operations but also to align them with broader economic and ecological objectives.

- **Course Prerequisites:** MAN 2591 Introduction to Operations and Supply Chain Management OR MAN 3504 - Introduction to Operations and Supply Chain Management and EGN 3448 Operations Research.

- Communication/Computation Skills Requirement (6A-10.030): No

Course Objectives and Learning Outcomes:

- Course Objectives:

Logistics & Sustainability is an advanced, project-based course exploring how modern supply chain logistics can be optimized for both **efficiency and environmental stewardship**. Students will learn to evaluate and enhance logistics operations while aligning them with broader economic and ecological goals. Key themes include **greenhouse gas (GHG) emissions management**, **circular economy strategies**, and the deployment of **cutting-edge technologies** to drive sustainable innovation.

Given that the logistics sector accounts for up to 11% of global greenhouse gas emissions and that a typical company's supply chain can generate **~80% of its total emissions**, sustainable logistics has become a critical corporate priority. This course integrates quantitative tools and emerging technologies – from **carbon accounting and life-cycle assessment (LCA) to AI-driven predictive analytics and digital twin simulations** – to develop solutions that reduce carbon footprints, waste, and risk across supply networks.

Students will analyze real-world cases, engage with industry data and guest speakers, and undertake a capstone project focused on **circular and low-carbon logistics** in a port ecosystem. By the end of the term, students will have practical experience designing **sustainable supply chain solutions** that meet evolving regulatory standards and industry best practices, without relying on a traditional textbook.

Course materials will include case studies, industry reports, and hands-on activities in lieu of a textbook, emphasizing applied learning in preparation **for careers in supply chain analytics, innovation, or sustainable logistics leadership**.

- Course Learning Outcomes:

By the end of this course, students will be able to:

1. **Fundamentals of Sustainable Logistics:** Explain core principles of sustainability and how they apply to supply chain and logistics management (e.g. environmental impact, efficiency, and resilience).
2. **Forward vs. Reverse Logistics:** Describe the differences between traditional forward logistics and reverse logistics, and discuss how reverse flows (returns, reuse, recycling) support circular economy models in supply chains.
3. **Life-Cycle Assessment (LCA):** Conduct basic life-cycle assessments to evaluate a product's lifecycle impact, and identify ways to reduce waste and carbon footprint at each stage of a logistics network.
4. **Carbon Accounting & Decarbonization:** Quantify supply chain carbon emissions (Scope 1, 2, 3) and evaluate the challenges and opportunities of decarbonizing logistics operations, including understanding why Scope 3 emissions often dominate corporate footprints.
5. **Circular Economy Strategies:** Analyze the role of circular economy strategies in logistics and supply chain resilience, and propose how adopting circular business models (e.g. reuse, remanufacturing, recycling) can reduce waste and create value.
6. **Sustainable Design & Procurement:** Assess how product design, sourcing, and procurement decisions influence sustainability outcomes, and recommend design-for-sustainability approaches (materials selection, packaging, etc.) that enhance circularity and reduce lifecycle impacts.
7. **Technology and Industry 4.0:** Evaluate how advanced technologies (Industry 4.0) can improve sustainable logistics – including the use of artificial intelligence (AI), Internet of Things (IoT), and

digital twin simulations – to optimize routing, forecasting, warehousing, and resource use. For example, AI-driven digital twin models have increased warehouse capacity by ~10% without new infrastructure.

8. **Data Analytics in Logistics:** Apply data-driven analysis and predictive analytics to logistics scenarios (e.g. demand forecasting, inventory optimization, route optimization) to improve efficiency and sustainability outcomes. (*Note:* basic analytical tools and software may be used in assignments; coding expertise is not required but an analytical mindset is essential.)
9. **Policy & Global Frameworks:** Analyze how global decarbonization policies and regulations affect logistics. This includes examining international and regional initiatives – e.g. IMO shipping emissions rules, EU "Fit for 55" transportation mandates, and the European Digital Product Passport (DPP) – and discussing how companies adapt to meet these regulatory and transparency requirements.
10. **Science-Based Targets & Reporting:** Understand corporate sustainability frameworks relevant to logistics, such as the Science Based Targets initiative (SBTi) for transportation emissions, GHG Protocol reporting standards, and industry pledges (e.g. Project Gigaton in retail). Students will be able to interpret sustainability reports and assess whether logistics strategies align with science-based climate goals.
11. **Risk & Resilience:** Evaluate geopolitical risks and other disruptions to global supply chains (trade wars, pandemics, natural disasters), and formulate strategies to build resilient logistics networks (e.g. diversification, near-shoring, safety stock) that balance efficiency with risk management.
12. **Teamwork & Communication:** Collaborate effectively in teams to analyze real-world cases and datasets. This includes researching a company or supply chain, conducting quantitative and qualitative analysis, and delivering well-organized presentations and reports. Students will hone professional communication skills by presenting complex logistics challenges and sustainable solutions to both technical and managerial audiences.
13. **Capstone Project Integration:** Design a comprehensive sustainable logistics solution for a port ecosystem industry partner. This capstone team project will require students to integrate course concepts – carbon accounting, circular economy, analytics, and policy considerations – into practical recommendations for a port-related company. (*Details in the Final Project section.*)

Note: These outcomes map to program-level goals in Business Analytics and Engineering, emphasizing creative problem-solving, quantitative analysis, and societal impact awareness in technology-driven supply chain contexts.

Course Materials and Resources

Required Textbook: *None*. There is no required textbook for this course. Instead, we will utilize a curated collection of **case studies, industry white papers**, and **research articles** provided via the course LMS (Canvas). This approach emphasizes current, real-world insights over traditional texts.

Case Studies: A Harvard Business Publishing case packet (and other case materials) will be used extensively. Each student team will be assigned specific cases to analyze and present (see Assignments). Example case studies include: *"Decarbonizing Shipping at A.P. Møller–Maersk" (HBS case)* – examining lifecycle analysis for low-carbon fuels in maritime logistics, and "*Amazon's AI-Driven Supply Chain"* – exploring how predictive analytics improve fulfillment efficiency. Additional cases from sources like MIT Sloan, CSCMP, or

Ivey may also be included. All students are expected to read all assigned cases to participate in discussions, even if not presenting that week.

Industry Reports & Articles: We will draw from up-to-date industry reports and thought leadership pieces, for example:

- World Economic Forum (WEF) reports on supply chain decarbonization and risk (*e.g. "Net-Zero Challenge: The supply chain opportunity"* and WEF articles like *"United for Net Zero: Public-Private Collaboration to Accelerate Industry Decarbonization"*).
- Ellen MacArthur Foundation (EMF) publications on circular supply chains and case examples of circular logistics initiatives.
- Professional journals and databases: Selected readings from Harvard Business Review, MIT Sloan Management Review, Logistics Management, etc., and technical papers on AI in logistics or LCA as needed.
- Regulatory and standards documents: Excerpts from the GHG Protocol Scope 3 Standard, Science Based Targets for Transport guidance, and EU policy briefs (e.g. factsheet on the EU Digital Product Passport).

Data and Tools: When possible, real or simulated datasets will be provided for hands-on exercises (e.g. emissions data, shipment records, route maps). We will use common software tools for analysis. No prior coding experience is required – tutorials/support will be given – but students should be ready to learn basic analytics tool usage.
Access to a computer capable of running data analysis (or the university computer labs) is required.

Canvas and Online Resources: All course announcements, supplemental readings, lecture slides, and assignment submissions will be managed through Canvas. Discussion boards may be used for follow-up questions and to facilitate online participation during hybrid sessions.

- Alignment with Program Outcomes:

This course aligns with both **Business Analytics** and **Mechanical Engineering** program outcomes by bridging data-driven decision-making with sustainable systems design.
The **13 Course Learning Outcomes** described earlier in this syllabus map to the broader **Program Learning Outcomes (PLOs)** listed below. Each CLO contributes to one or more PLOs by developing students' ability to analyze complex logistics systems, apply quantitative tools, and design environmentally and economically sustainable solutions.

	Course Learning Outcome and Learning Level*				
Business Analytics Program Student Outcome	**1**	**2**	**3**	**4**	**5**
(1) Apply current business analytics concepts, techniques, and practices to solve business problems.					Create
(2) Analyze a given business problem using appropriate analytics techniques to generate insights and solutions.				Evaluate	
(3) Communicate effectively insights, analysis, conclusions, and solutions to a diverse audience.			Evaluate		
Mechanical Engineering Program Student Outcome	**1**	**2**	**3**	**4**	**5**
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Create				
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors			Evaluate		
(3) an ability to communicate effectively with a range of audiences				Evaluate	
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts		Understand			
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives					Analyze
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions			Evaluate		
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.					Evaluate

Academic Support Resources

- **Library:** Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center:** The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).
    - **Knack Tutoring:** Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit https://www.joinknack.com/student/florida-polytechnic-university and sign in with your student account.
- **Academic Success Coaches:** All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center:** Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit www.floridapoly.edu/writingcenter.

Course Policies

Attendance

Because this is a hybrid course, your attendance is based on both face-to-face attendance and online activity, as well as participation.
The following is a summary of everyone's expected participation:

- **On campus:** Once per week.
- **Logging in:** At least once per week to pass the course. If you have a situation that might cause you to miss an entire week of class, please discuss it with me as soon as possible.
- **Excused absences/non-participation:** Excuses for missing an entire week of participation are similar to excused absence excuses in an in-person class. A death in your immediate family, illness, or a major mental health emergency would count because these understandably affect more than 1-3 days of work. All excused non-participation must be documented in writing (doctor's note or similar).

Late Work/Make-up work

Each student must keep current on assignments. Late assignments are not graded, unless permission has been obtained from the instructor. In case of a medical emergency, please notify your instructor as soon as possible who will evaluate any exceptions on a case-by-case basis.

Pace of Online Activities

This course is an asynchronous course – meaning that you will be working on it at different times than your colleagues. This course is not a self-passed class or an independent study. You will have assignment deadlines, and work must be submitted on time. Each assignment sequence must be completed on schedule – you can't work ahead or get behind and be successful.

Course Communication and Feedback

The best way to contact me is via email. I will try to respond within two business days. I will make every effort to reply on the same business day to emails, and normally I will be able to. Expect that responses will likely be slower over the weekend. For larger assignments, you can generally expect feedback within 7 days.

Grading Scale

The following grading scale will be used according to FL Poly policies:

93 to 100	A	73 to 75.99	C
90 to 92.99	A-	70 to 72.99	C-
86 to 89.99	B+	66 to 69.99	D+
83 to 85.99	B	63 to 65.99	D
80 to 82.99	B-	60 to 62.99	D-
76 to 79.99	C+	Below 59.99	F

(See also University Grading Policy).

Assignment/Evaluation Methods

Assignment	Percentage
Attendance and Participation	**10%**
Individual Assignments	**25%**
Carbon Footprint Analysis Exercise	5%
LCA Mini-Report	5%
Digital Twin Simulation Reflection	5%
Guest Lecture Reflection Memo	5%
Resilience Simulation Reflection	5%
Team Case Study Presentations & Briefs	**20%**
Final Project	**45%**
Mid-Term Project Proposal	5%
Presentation	20%
Report	15%
Total	**100%**

Your performance in this course will be evaluated through a mix of team-based projects, individual assignments, case studies, and participation. The goal is to emphasize applied learning and real-world engagement over rote memorization. **There are no traditional exams or quizzes** – instead, **industry-focused**

assignments and the final project will assess your understanding. The weighting of course components is as follows:

- Class Participation & Engagement – 10%: Active, thoughtful participation in class discussions, case Q&As, and online forums. This includes contributing to in-class activities, being prepared with readings, engaging respectfully with guest speakers, and offering constructive feedback to peers. Since much of the learning is through discussion and hands-on exercises, participation is critical (and fun!). Attendance is part of this grade – more than two unexcused absences may lower your score. *(Note: Because the course is hybrid, participation can include online discussion posts or chats during virtual sessions. Quality of contributions matters more than quantity.)*

- Individual Assignments – 25%: These are short assignments aimed at reinforcing key skills, often with an industry integration element. Tentative breakdown:

    - Carbon Footprint Analysis Exercise (5%) – In Week 2, you will complete a worksheet calculating logistics emissions from a provided dataset and answer questions about emission hotspots and reduction levers.

    - LCA Mini-Report (5%) – In Week 3 or 4, you will analyze an LCA case (e.g. a 2-page brief on a product's footprint) and submit a 1-page summary of improvement ideas based on the LCA results.

    - Digital Twins Simulation Reflection (5%) – In Week 7, students will complete a mini-simulation exercise exploring how logistics network design decisions impact both cost and carbon emissions. Using an Excel-based digital twin model demonstrated in class, students will modify one parameter (such as transport mode, warehouse count, or route distance) to observe how the total cost and CO_2 output change. Each student will then submit the completed Excel file and a short 200–250-word reflection discussing their results and insights. This activity reinforces the course's applied learning objective on leveraging Industry 4.0 technologies for sustainable logistics optimization.

    - Guest Lecture Reflection Memo (5%) – After the Week 11 guest speaker, submit a 1-2 page memo connecting the talk to course concepts, as described above.

    - Resilience Simulation Reflection (5%) – After the Week 12 disruption simulation, a short write-up on what your team learned and how you'd improve your supply chain strategy. (If any of these are replaced or combined, the 20% may consist of four ~5% assignments or two larger ~10% assignments. Exact assignments will be confirmed in class.)

- Team Case Study Presentations & Briefs – 20%: Students will pair in groups of two, who take the lead on two case studies during the semester (10% for each case). Each team will prepare a written Case Brief (approximately 3 pages) and deliver an in-class presentation (~20-30 minutes including discussion) analyzing the case. The brief and presentation should cover: background of the company/industry, the sustainability challenge or decision faced, relevant quantitative analysis (if data provided), stakeholder perspectives, and your team's recommendations or answers to the case questions. Creativity in presentation (visuals, engaging the class) is encouraged. Grades will

consider the depth of analysis, clarity of recommendations, and the ability to spur class discussion. All students (not just presenting teams) are expected to read every case and contribute to the Q&A – part of your participation grade reflects this preparation. *(See the Case Brief Guidelines in the syllabus appendix for detailed expectations – e.g. include analysis of environmental, economic, and policy aspects as applicable.)*

- Midterm Project Proposal – 5%: Around Week 8, teams will submit a brief Project Proposal/Plan for the final project. This 2-page document (plus a preliminary reference list) should identify the port ecosystem company or problem you will tackle, provide some initial background research, and outline your intended approach (what data you might use, which sustainability aspects you'll focus on, etc.). One team member will also give a 5-minute informal update to the class ("lightning talk" style) to get feedback. This proposal ensures you have a solid direction and allows the instructor to give early guidance. Grading is based on clarity of problem definition and the feasibility/ambition of your plan.

- Final Project (Report & Presentation) – 40%: The capstone team project is the cornerstone of the course, bringing together all major learning outcomes. (See next section for a full brief.) The project grade is divided into two parts:

    - Project Presentation (20%) – your team's oral presentation in Weeks 14–15, including slides and Q&A performance. Focus is on how well you communicate your analysis and persuade the audience of your recommendations.

    - Project Report (15%) – a written report ~15 pages (excluding appendices) that details your analysis, findings, and recommendations, with supporting data, calculations, and references. It should be professionally formatted as if consulting for the company. Both the content (depth and insight of analysis) and the quality of writing will be evaluated.
      Within the project, peer evaluations may be used to adjust individual grades if there is evidence of unequal contribution. This project replaces a final exam – you are demonstrating mastery by solving a real-world problem.

Note on Grading: Letter grades will be assigned according to the university's standard scale (see Course Policies). To achieve an A, aim for excellence in both analysis and application: show you can not only dominate concepts, but also think critically about trade-offs and implementation in a real context. Detailed rubrics will be provided for the case studies and final project (see syllabus appendix for the final project rubric highlighting criteria like problem analysis, creativity of solutions, application of circular economy principles, impact assessment, presentation quality, and teamwork). Late submissions may incur penalties unless previously approved, especially given the collaborative nature of many tasks.

We encourage you to treat these assignments as opportunities to produce portfolio-worthy work. For instance, a standout case analysis or the final project could be something you discuss in job interviews to demonstrate your skills in sustainable logistics and analytics.

Final Project: "Sustainable Logistics Solution for a Port Ecosystem"

Project Brief: For your capstone project, your team will act as a sustainability consulting task force for a port-related enterprise. Each team will choose an **organization within a port ecosystem** – for example, a port authority department, a terminal operator, a major shipping company or carrier at the port, a warehousing/distribution center in the port area, or a manufacturer heavily linked to port logistics. You will evaluate the entity's current logistics operations and identify key sustainability challenges it faces (carbon emissions, waste generation, inefficiencies, regulatory compliance issues, etc.). Building on course concepts, your team will then **propose a set of innovative strategies to improve both the environmental and operational performance** of those logistics activities.

Focus Areas: While each project will be unique to the chosen organization, every project should incorporate:

- **Circular Economy Strategies:** Ideas to reduce waste and "close the loop." For example, can you introduce reuse of materials or by-products, improve container reuse, implement recycling programs, or facilitate product take-back programs in this context? The goal is to move toward a circular model, as this is "essential in today's world – it's not just about reducing waste; it's about protecting natural resources, driving innovation, and contributing to long-term supply chain resilience".

- **Carbon Emissions Reduction:** Assessment of the logistics carbon footprint (qualitative or quantitative) and specific measures to cut GHG emissions. This might include optimizing routes or modes (e.g. shifting truck transport to rail or deploying electric vehicles for drayage), improving energy efficiency of port equipment, adopting renewable energy (solar panels on warehouses), or even nature-based solutions (like restoring mangroves near the port to offset emissions). Tie your recommendations to Science-Based Targets or relevant climate goals where possible.

- **Digital Technology Leveraging:** Evaluate how technologies like data analytics, AI, or digital twin simulations could support your proposed solutions. For instance, could a digital twin help model traffic flow and reduce idling times (cutting fuel use)? Could AI improve cargo handling scheduling to save energy? While you are not required to build a software tool, propose how tech can facilitate sustainability (show that you, as future supply chain innovators, know how to harness Industry 4.0).

- **Regulatory and Stakeholder Considerations:** Consider upcoming regulations or community pressures that affect your client. For instance, how will IMO 2030/2050 goals or local environmental laws impact operations? Are there community or labor concerns with current practices? Your plan should ensure compliance and ideally turn compliance into an opportunity (e.g. getting ahead of a regulation to gain positive public relations or avoid last-minute costs).

- **Quantitative Analysis:** Include some form of analysis to back your recommendations. Depending on data availability, this could be an estimation of current emissions or costs and the projected savings/impact of your proposals. For example, calculate the potential CO_2 reduction if the company electrified 50% of its vehicles, or the cost vs. benefit of installing on-site solar for warehouse power. Use figures from research or analogous cases if primary data is limited (cite your sources). Financial insight (ROI, payback period) for initiatives can strengthen your case.

- **Implementation Roadmap:** Provide a brief roadmap for how the organization should implement your recommendations. This might include a timeline, key milestones, partnership suggestions (maybe

collaborating with a tech provider or a recycling firm), and how to monitor progress (KPIs like emissions per container move, waste diversion rate, etc.). Emphasize any quick wins vs. long-term initiatives.

Deliverables:

- Written Report: ~15 pages, double-spaced (approx. 4000 words, not counting appendices or references). It should include an executive summary, introduction/background on the organization and context, analysis of current challenges, your proposed solutions (with justification and expected impacts), and a conclusion. Use visuals like charts, graphs, or process flow diagrams where helpful (e.g. a before-and-after process map illustrating how your plan changes things). All external data and references must be cited (APA or IEEE citation style; academic honesty is expected). Aim for a professional tone – imagine this is a report to the organization's senior management.

- Presentation: Each team will have 15–20 minutes to present, plus Q&A. Think of this as pitching your sustainability improvement plan to the company's executives (and your classmates/instructor will play that role in questions). Focus on clear communication: define the problem, highlight the most compelling insights from your analysis (use charts or images for emphasis), and then sell your recommendations and their benefits. Every team member should speak during the presentation. Practice to ensure you stay within time and deliver a polished presentation – this is your chance to showcase your expertise!

- Interim Milestones: To keep you on track, we have interim checkpoints: a project proposal (Week 8, as noted), and likely a mid-project update (Week 12) where teams share a one-page progress report or meet briefly with the instructor to troubleshoot challenges (this will be informal but ensures no team falls behind). We strongly encourage setting up a meeting with the instructor or industry mentor for feedback on your analysis approach in the second half of the semester.

Project Ideas and Support: The "port ecosystem" theme is intentionally chosen because of Florida's proximity to major ports and the unique convergence of logistics issues there (shipping, trucking, warehousing, environmental impact on communities, etc.). Florida Poly has connections with Port Tampa Bay – including past student visits and data sharing – which we will leverage.

Possible project examples: analyzing cold-chain logistics for produce coming through the port (balancing energy use and spoilage), or managing waste and reuse, or improving circular handling of shipping pallets or packaging at the port, or designing a system to supply shore power to docked ships (reducing diesel emissions).

During the first few weeks, start thinking about what aspect of port logistics excites you – we will form teams and choose projects by Week 4. If you have an idea for a different context (not port-related) that still fits the course themes, discuss it with the instructor – with approval, alternatives may be allowed, but it must involve a logistics network and a sustainability challenge of similar scope.

Assessment: See the grading rubric for detailed criteria. In brief, you will be evaluated on the depth of your analysis (did you identify root causes and use data?), the creativity and effectiveness of your solutions (are they innovative yet realistic?), the clear application of course concepts (we should see that you've applied

frameworks like circular economy principles or analytics learned in class), and the professional quality of your report and presentation (organization, clarity, visual design, delivery). Every team member will receive the same base score, adjusted if needed by peer evaluation. This project is a significant portion of your grade, but more importantly, it is a chance to apply your knowledge to a real problem and potentially make an impact. Top projects may be shared with the industry partners or considered for presentation at events, so take pride in producing something that goes beyond a class assignment!

CANVAS Policy:

- Assignments, announcements, and information will be posted on CANVAS. Students are responsible for checking CANVAS regularly to be aware of their assignments and other class information. Please see the end of this document for guidelines for submission of assignments.

Email Policy:

- All students are required to use studentuserID@floridapoly.edu email system (most preferable) OR the CANVAS e-mail system to communicate with the instructor. On occasion, email may be used to disseminate important class-related assignments, announcements, and information. Students are responsible for any information or assignments given in e-mail.

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS) facilitates reasonable accommodation for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodation. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; www.floridapoly.edy/disability.

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity

Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). *Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is prohibited.*

Course Schedule

Tentative Schedule

The instructor reserves the right to modify this schedule as required by the progression of the class

Week #	Date	Topics / Activities / Readings & Assignments
1	12-Jan 14-Jan	Introduction to Sustainable Logistics Topics: • Course overview and expectations. • The business case for sustainability in supply chains. • Key environmental and social impacts of logistics (carbon emissions, waste, labor considerations). Discussion of major trends: why companies are investing in sustainable logistics (consumer pressure, cost savings, regulations). Activities: Interactive discussion: • Brainstorm examples of logistics sustainability challenges students have heard of (e.g. delivery vehicle emissions, packaging waste, COVID-19 disruptions). • Short video: "How operationalizing supply chain sustainability drives business." Readings: • Earth.org/WEF article: "Importance of Sustainable Supply Chains for Decarbonization" – highlights that supply chains can comprise 60–90% of a firm's emissions and 80% of its GHG impact. • Case brief: "Global Supply Chain at Starbucks" (brief example of sustainability efforts in sourcing and distribution).
2	19-Jan	NO CLASS – MARTIN LUTHER KING JR. HOLIDAY
	21-Jan	Carbon Footprinting & Emissions Transparency Topics: • Understanding carbon footprints in logistics. • GHG accounting for transportation, warehousing, and supply chains: Scope 1 (direct fuel use in fleets, facilities), Scope 2 (electricity for warehouses, etc.), and Scope 3 (all upstream/downstream emissions). • Tools and standards for emissions measurement (GHG Protocol, ISO standards). • The rise of emissions transparency and pressure for suppliers to report carbon data. Introduction to carbon footprint calculation with a simple example (e.g. emissions from moving a shipping container or running a warehouse for a year). Activities: Mini-workshop on carbon accounting:

		• Students work in small teams on a provided dataset (e.g. a company's logistics activities data) to estimate total CO_2 emissions. • Teams identify which emissions fall under Scope 3 vs others. Group discussion on challenges of obtaining accurate Scope 3 data. **Readings:** • Carbon Chain report: "Supply Chain Carbon Emissions: Impacts and Risks" – which notes that a typical supply chain can account for 80%+ of a company's GHG emissions. • GHG Protocol Summary (posted on Canvas) – overview of Scope 1, 2, 3 accounting rules. (CANVAS).
3	26-Jan 28-Jan	**Life-Cycle Assessment in Supply Chains** **Topics:** • Life-Cycle Assessment (LCA) methodology for products and logistics processes. • Stages of the product life cycle: raw material extraction, manufacturing, transportation, use, end-of-life. How to evaluate environmental impacts (carbon, energy, water, etc.) across the supply chain. • Case examples of LCA findings (e.g. carbon footprint of a smartphone – often most emissions come from supply chain manufacturing and transport). Using LCA to identify "hotspots" and drive improvements. **Activities:** Case analysis in class: • Examine a published product LCA (e.g. an Apple Environmental Report for iPhone). • Students interpret which supply chain stage has the highest impact and brainstorm ways to reduce it (material changes, logistics adjustments). **Readings/Videos:** • Case: "Levi's Life Cycle of a Pair of Jeans" (an industry case study on performing LCA and making supply chain changes). (Canvas). • Academic excerpt Case: "How BMW Started Auditing Emissions Across The Supply Chain" (Canvas). • Video: "Life Cycle Assessment (LCA) For Beginners".
4	02-Feb 04-Feb	**Corporate Sustainability Targets and Reporting** **Topics:** • Science-Based Targets (SBT) and corporate climate pledges in logistics. • How companies set emission reduction goals in line with climate science (e.g. aligning to a 1.5°C scenario) and what that means for their supply chains. • Overview of the Science Based Targets initiative for transport/logistics companies – e.g. targets for fleet electrification, fuel efficiency, renewable energy in warehouses. • The role of reporting frameworks: CDP supply chain questionnaires, sustainability reports, and emerging SEC climate disclosure requirements (which may mandate Scope 3 disclosure). • Discussion of emissions reduction strategies: route optimization, modal shifts (truck to rail), fleet electrification, sustainable fuels (biofuels, hydrogen).

		Activities: • Analyze a real company's sustainability report (e.g. DHL's GoGreen Logistics report or Maersk's Sustainability Report): What are their logistics-related targets (CO_2 per container, etc.)? Are they on track? Students break into groups to evaluate one company each and share one interesting target or initiative. • Short quiz game (ungraded) on key concepts and terminology introduced so far (to reinforce carbon vs climate vs circular concepts). **Readings:** • SBTi Report: "SBTi Corporate Net-Zero Standard - Version 2.0" (Canvas). • Company example: Excerpts from "Maersk's Net-Zero by 2040 Strategy" – focusing on how a major logistics company sets science-based targets for shipping • Company example: DHL's GoGreen Logistics report
5	09-Feb	**Decarbonization Policies & Global Regulations** **Topics:** • The regulatory landscape shaping sustainable logistics. Global policy drivers: e.g. International Maritime Organization (IMO) regulations capping shipping emissions and new fuel economy or emissions standards for trucks (EURO 7, EPA rules). • Regional initiatives: The EU's climate policies affecting logistics – e.g. inclusion of shipping in EU Emissions Trading System, upcoming EU Digital Product Passport (DPP) requiring product lifecycle data transparency. • Carbon border taxes (e.g. EU CBAM) and their indirect impact on supply chains. National/local policies: Example of California's zero-emission truck mandates, urban low-emission zones for delivery vehicles, and government incentives for green logistics (grants for EV trucks, etc.). • Also, discussion of waste and recycling regulations that impact reverse logistics (extended producer responsibility laws).
	11-Feb	**Activities:** Policy case debate: • Split the class in half to debate a new regulation's impact – e.g. "Should governments mandate zero-emission freight by 2040?" One side from industry perspective (feasibility/cost concerns), other from environmental perspective (urgency/health benefits). The class then discusses how companies can proactively adapt to or anticipate regulations to gain competitive advantage. **Readings:** • Policy brief: "EU's Digital Product Passport: Advancing Transparency" – outlines how the DPP will require sharing product and supply chain data to improve sustainability. • The EU's Carbon Border Adjustment Mechanism (CBAM) • Euro 7: The new emission standard for light- and heavy-duty vehicles in the European Union (Canvas)

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AWS: “Global Logistics Emissions Council Framework” – discusses the importance of harmonizing regulations worldwide. (Canvas)
Ellen MaCArthur: Extended Producer Responsibility - Statement and Position Paper – (Canvas)

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Team Case Study Presentations I – Decarbonizing Logistics

Topics: Case study analyses focusing on decarbonization strategies in logistics.

This week is dedicated to student-led case presentations and discussion (Class on Feb 18 will be synchronous).
Case Study examples: “Decarbonizing Shipping at Maersk (A)” – examining how the world’s largest shipping line is shifting to low-carbon fuels and the results of its life-cycle analysis on alternative fuels; “Schneider Electric: Mapping the Long Road to Net-Zero (A)” – challenges and strategic choices to retain its leadership and meet its decarbonisation commitments (students dissect the approaches: supplier engagement, renewable energy, leadership).
Each case touches on multiple course themes: carbon accounting, supplier collaboration, and policy response. All students must read all cases.

Presentation teams will submit a 3-page case brief and discussion questions.

Activities: Team Presentations:

Four teams (each 4-5 students) will present their case analysis (30 minutes each including Q&A).
Presentations will cover case background, the sustainability challenge, quantitative analysis of options, and recommended solutions.
Peers in the audience are expected to have read the cases and will ask questions/challenge assumptions, simulating a professional review.

Readings (Canvas):

Case 1: HBS Case: “Schneider Electric: Mapping the Long Road to Net-Zero (A)”.
Case 2: HBS Case: “Circular Economy at Scale (A): LanzaTech's Mission to Turn Pollution into Profits”
Case 3: HBS Case: “JSW Steel: Balancing Growth While Decarbonizing”

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7	23-Feb 25-Feb	**Digital Twins & Network Optimization** **Topics:** • Digital Twins and simulation for logistics network design. Introduction to the concept of a digital twin: a virtual model of a physical supply chain system (e.g. a warehouse or entire transport network) that can be used to run scenarios. • How companies use simulation modeling to optimize routes, inventory placement, and facility layout. Examples of optimization: using digital twins to test different warehouse configurations or transportation modes without disrupting the real system. • Emphasis on how this technology can identify efficiency gains and sustainability improvements (reducing miles traveled, better load utilization, energy savings). • Case/Example: A McKinsey case where a logistics provider used an AI-powered digital twin to boost warehouse capacity ~10% with no new construction. • Discussion of software tools (AnyLogic, Siemens Digital Twin, etc.) and data requirements. **Activities:** In-class demonstration: • The instructor walks through a simple supply chain simulation (e.g. using an open-source tool or Excel solver model for network optimization). Students experiment with changing one parameter (like transport mode or warehouse count) to see effects on cost and emissions. • Brainstorm: If given a digital twin of our campus supply deliveries, what changes might we test to reduce emissions (consolidating routes, timing deliveries differently, etc.)? **Readings:** • Article: "State of the Art of Digital Twins in Improving Supply Chain Resilience" (Canvas). • McKinsey blog excerpt: "Harnessing AI in Distribution Operations" – featuring the warehouse digital twin example. • McKinsey Article: "Safer, greener, faster: AI-powered supply chains in action" (Canvas). • MIT Article: "Unlocking the Potential of Digital Twins in Supply Chains" (Canvas).

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<tr><td rowspan="2">8</td><td>02-Mar</td><td>AI and Predictive Analytics in Logistics

Topics:

• The role of Artificial Intelligence (AI) and machine learning in modern logistics.
• Key applications: demand forecasting (using AI to better predict sales and inventory needs), predictive maintenance for fleets (anticipating repairs to reduce downtime), dynamic routing (AI optimizes delivery routes in real-time for fuel efficiency, e.g. UPS Orion system), and warehouse automation (AI for picking optimization, robotics).

We also cover how AI can help with sustainability goals: e.g. reducing excess inventory (cuts waste), optimizing speed vs. energy use, or even predicting disruptions (like weather or port delays) to mitigate them. Discussion of data requirements and challenges (data quality, algorithm bias, the need for human oversight).

Activities:

• Case snippet: Review a short video on “AI at Amazon’s Fulfillment Centers” and “Amazon's new robotic fulfillment center streamlines the delivery process” – how algorithms orchestrate inventory placement and shipping for speed and efficiency.
• Class breaks into small groups to list potential benefits and risks of relying on AI in supply chains (one group focuses on efficiency gains, another on sustainability, another on risks like job impacts or errors).

Readings:

• MIT Blog: “The role of Artificial Intelligence (AI) and machine learning in modern logistics.”
• RTS Labs report: “Top 10 Logistics AI Use Cases in 2024” – covers AI in forecasting, pricing, maintenance, etc.</td></tr>
<tr><td>04-Mar</td></tr>
<tr><td>9</td><td>09-Mar</td><td>Circular Economy & Reverse Logistics

Topics:

• Circular economy in logistics – strategies to keep materials in use and eliminate waste.
• Deep dive into reverse logistics systems: product return flows, recycling programs, refurbishment, and remanufacturing processes. How companies design supply chains for circularity (for example, closed-loop systems for electronics or batteries, reusable packaging loops in retail, or the handling of end-of-life products).
• Benefits of circular logistics: reducing raw material needs, mitigating supply risks, and often saving costs.
• Challenges: coordination, economics of returns, and ensuring quality of reused components. We will reference frameworks like the EMF’s circular economy principles (design out waste, keep products/materials in use, regenerate natural systems).</td></tr>
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	11-Mar	**Activities:** • Interactive exercise: Students map out the reverse logistics process for a specific product (e.g. used smartphones, or plastic beverage bottles). • Where are the collection points, who processes the returns, what is done with the recovered material? • Each group identifies obstacles in that process (e.g. consumer participation, sorting complexity, cost) and suggests one improvement or innovation (maybe aided by technology or policy). Share results to see common themes. Additionally, discuss a real example like HP's printer cartridge return program or Patagonia's Worn Wear initiative as illustrations of circular logistics in action. **Readings:** • Ellen MacArthur Foundation case study: "Circular Supply Chains – Examples and Successes" (selections on companies implementing circular logistics). • Forbes article: "Why A Circular Economy Is Key To U.S. Supply Chain Resilience" – tying circular practices to supply chain risk reduction.
	06-Mar 18-Mar	**Spring Break – No Classes**
10	23-Mar 25-Mar	**Team Case Study Presentations II – Innovation & Circularity** **Topics:** • Second set of student-led case studies, focusing on innovative sustainable logistics solutions (tech or circular economy related). (Class on Mar 25 will be synchronous.) • Example cases that may be assigned: "How Generative AI improves Supply Chain Management" – how digitization improved traceability and reduced waste (while ensuring sustainability and safety in logistics); "How Digital Integration Is Reconfiguring Value Chains" – a case of a manufacturer building a remanufacturing network for vehicle parts. • Alternatively, a case on a geopolitical disruption and response: "How Circularity Can Be A Strategic Response To Tariffs". The exact cases will align with class interests and current events, but will require teams to analyze both the technical solution and its sustainability impact. All students must read all cases. Presentation teams will submit a 3-page case brief and discussion questions. **Activities:** • Team Presentations: Student teams present their second case analysis (each ~20–30 min with Q&A). These presentations should highlight how innovative approaches (be it a new technology platform or a circular business model) solved a logistics problem and improved sustainability metrics. Students in the audience will again engage in Q&A and discuss how the case's lessons could apply more broadly. **Readings:** • Case 1: HBS Case: "How Generative AI improves Supply Chain Management." (Canvas)

		• Case 2: HBS Case: "How Digital Integration Is Reconfiguring Value Chains" (Canvas) • Case 3: HBS Case: "How Circularity Can Be A Strategic Response To Tariffs" (Canvas)
11	30-Mar	Industry Engagement – Guest Speaker Panel Topics: • Gaining real-world insight from industry professionals. This week features a Guest Speaker (or panel of speakers) from the logistics/supply chain industry, focusing on sustainability initiatives. • We aim to visit the Port of Tampa Bay for a boat tour and have: Guest Speaker: a senior manager from Port Tampa Bay or a partner company in the port ecosystem. They will discuss the port's sustainability challenges and projects (e.g. efforts to implement electric port equipment, optimize shipping routes, on-shore power for vessels, or collaborative circular economy programs at the port). • We will prepare by reviewing the port ecosystem context. The discussion will likely touch on many course themes – emissions reduction, regulatory compliance (ports must meet IMO rules), use of data and tech at the port, and circular approaches (like reusing dredge materials or optimizing container reuse).
	01-Apr	Activities: • Guest Lecture and Q&A: Students are expected to come prepared with questions for the speaker. After the guest presentation, there will be an interactive Q&A session. • We will then have an open discussion linking the speaker's points to course concepts – for instance, if the speaker talked about measuring the port's carbon footprint, we connect to our carbon accounting module; if they discussed recent supply disruptions (hurricanes, etc.), we tie to resilience strategies. • Follow-Up Assignment: Each student will write a short Guest Lecture Reflection Memo (1–2 pages) summarizing key insights from the speaker and relating at least one insight to a concept or framework from class. This memo will be due the following week and will count toward the "Industry engagement" portion of the grade. Readings: • Backgrounder: "Port Tampa Bay Sustainability Overview" (news article from Florida Poly featuring our course's previous collaboration[8]). This provides context on the port ecosystem project and illustrates how circular economy strategies are being considered at the port.

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Geopolitical Risks and Resilient Supply Chains

Topics:

- Building resilient supply chains in an era of uncertainty. We examine how geopolitical events (trade wars, chokepoints, the Russia-Ukraine conflict) and global crises (COVID-19 pandemic, natural disasters due to climate change) disrupt logistics networks.
- Concepts: risk identification and mapping (tier-2 and tier-3 supplier risks), business continuity planning, diversification vs. cost optimization trade-offs, and the shift from just-in-time to "just-in-case" inventory strategies.
- We'll discuss real examples like the 2021 semiconductor shortage (and how companies responded by reshoring or dual-sourcing) and how companies are preparing for climate-related disruptions (floods, storms affecting ports).
- Strategies for resilience include: multi-sourcing, inventory buffers, adaptable transportation modes, and digital risk monitoring systems.

Activities:

- Simulation Game: We will play a simplified supply chain disruption simulation – students, in teams, manage a supply chain for a product and are hit with random "events" (factory fire, political sanction, etc.).
- Teams must decide on responses (e.g. use backup supplier, reroute shipments, accept delays) and see the outcomes in cost and service. Afterward, we debrief: Which strategies worked best? What preparation could have mitigated the impacts? Students reflect on the balance between lean efficiency and resilience.

Readings:

- Article: "The Pandemic Exposed Fragile Supply Chains – 3 Ways to Build Resilience" (WEF, 2024) – highlights how companies are shifting priorities in light of geopolitical shifts.
- McKinsey Global Survey: "Supply chains: Still vulnerable" – key findings on what measures supply chain leaders are taking (e.g. increasing transparency via digital tools, regionalizing supply networks). (Canvas)

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Future Trends and Course Synthesis

Topics:

- Emerging trends at the nexus of logistics and sustainability, and review of course takeaways.
- We'll look ahead to what the future might hold: green transportation technologies (electric and hydrogen trucks – how quickly will they scale?; sustainable aviation fuel and electrified short-haul flight; alternative maritime fuels like ammonia or methanol), automation and robotics in logistics (and their sustainability implications), blockchain for supply chain transparency (enabling provenance tracking and possibly ensuring ethical sourcing).
- Also, discuss the role of consumer behavior and emerging concepts like product-as-a-service models reducing the need for ownership (affecting logistics flows). We will revisit how all these pieces fit together to create sustainable, circular, and resilient

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	15-Apr	supply chains. Activities: • **Course Wrap-up Discussion:** Students share their biggest "aha" moments from the course – a concept or case that changed how they view supply chains. • We create a collective mind-map on the board linking major themes: e.g. how AI can aid carbon reduction, how circular economy ties into resilience, how policy drives innovation, etc. • This solidifies an integrated understanding. Finally, we'll have an open Q&A for the final project as teams finalize their work, clarifying any concepts needed. Readings: • World Economic Forum –The pandemic exposed fragile supply chains: Here are 3 ways to strengthen them and build on global trade • World Economic Forum – Emerging economies can lead the way on green logistics. Experts explain why. • Boston Consulting Group (BCG) article: The Energy-Efficient Route to Maritime Decarbonization (Canvas).
14	20-Apr	Team Project Presentations (Day 1): • Teams will deliver formal presentations on their final projects (see Final Project section for details). Each team has ~15–20 minutes to present their project findings and recommendations, followed by ~5 minutes of Q&A. • The audience (including possibly external guests or the instructor acting as a "client") will ask questions to probe the feasibility and insight of the proposals. • Students not presenting on a given day are expected to actively participate by asking questions and providing peer feedback. (If needed, an additional session may be scheduled during finals week to accommodate all teams.) **Note:** There are no new readings or lectures this week; focus is on delivering and critiquing final projects. Teams should incorporate any feedback from their earlier project checkpoints.
	22-Apr	Team Project Presentations (Day 2): Same as Day 1
15	27-Apr	Final Project Presentations (Day 3) & Course Conclusion Activities: • Team Project Presentations (Day 3): Remaining teams present their projects with the same format as Week 14. After all presentations are completed, we will have a closing session. • **Wrap-up:** Instructor highlights common themes and exceptional ideas from the projects, and how they relate back to the course objectives. We'll also discuss how students can apply what they learned in their upcoming careers (e.g. mention of job

		roles like Sustainability Analyst, Logistics Engineer, Supply Chain Data Scientist, etc., and how course topics appear in those contexts). Course evaluations will be conducted. We end by reflecting on the importance of continuing to drive sustainability in logistics – a challenge and opportunity students are now equipped to lead. **Final Deliverables:** Final written project reports are due (if not already submitted on presentation day). Any remaining peer feedback forms or self-reflections on the project experience are collected.
	29-Apr	Reading Day - No class
16	26-Apr - 01-May	NO FINAL EXAM

Appendix A – Case Brief Guidelines

Each Case Brief should be approximately **three pages (double-spaced)** and written as if you were preparing an executive report for a management audience. The purpose is to demonstrate your ability to analyze logistics sustainability challenges through **environmental, economic, and policy lenses**.

Your Case Brief must include:

1. **Background & Context**
    - Identify the company or industry, its logistics or supply chain structure, and the sustainability relevance of the case.
2. **Sustainability Challenge**
    - Define the key issue(s) clearly, supported by data when possible (e.g., emissions, costs, waste volumes).
    - Link the challenge to frameworks such as the **GHG Protocol**, **Science Based Targets**, or **Circular Economy Principles**.
3. **Analysis of Environmental, Economic, and Policy Aspects**
    - **Environmental:** Quantify or describe environmental impacts (carbon footprint, energy use, waste, etc.).
    - **Economic:** Discuss operational or financial implications (efficiency, ROI, cost-benefit trade-offs).
    - **Policy:** Note how regulations, standards, or incentives influence decisions (e.g., IMO, EU DPP, or national transport mandates).
4. **Stakeholder and Strategic Considerations**
    - Identify stakeholders (internal/external) and their interests or conflicts.
    - Explain how the company balances stakeholder expectations with sustainability performance.
5. **Recommendations**
    - Propose **actionable, evidence-based strategies** to address the challenge.
    - Include considerations of feasibility, scalability, and innovation.
6. **Lessons Learned / Reflection**
    - Highlight transferable insights from the case (what other companies could learn).
7. **Formatting**
    - Include visuals (charts/tables) where useful, and cite all sources (APA or IEEE style).
    - Submit as a **single PDF or Word document** via Canvas.

Rubric for Evaluating the Circular Supply Chain and Logistics Final Project

Project Title: *"Designing Circular Supply Chain and Logistics Solutions for Industries in a Port Ecosystem"*

Evaluation Criteria and Rubric

Criteria	Weight (%)	Excellent (90–100%)	Good (75–89%)	Satisfactory (60–74%)	Needs Improvement (<60%)
Problem Analysis	20%	Comprehensive identification of supply chain stages, challenges, and opportunities within the port ecosystem.	Clear identification of supply chain stages, challenges, and opportunities, with minor gaps.	Basic identification of challenges and opportunities; limited depth and analysis.	Inadequate or unclear problem identification with minimal analysis.
Innovation and Creativity	25%	Highly innovative, practical, and feasible circular strategies addressing challenges effectively.	Innovative strategies with good feasibility; minor opportunities for refinement.	Strategies show limited innovation and practicality, with some feasibility concerns.	Strategies lack innovation, feasibility, or alignment with project goals.
Application of Circular Economy Principles	20%	Demonstrates excellent application of circular economy principles (e.g., reducing waste, retaining value).	Good application of circular economy principles; alignment is generally consistent.	Basic application of principles with some misalignment or missed opportunities.	Weak or unclear application of circular economy principles; lacks alignment.
Feasibility and Impact Assessment	15%	Provides a thorough and realistic evaluation of economic, environmental, and operational impacts.	Provides a reasonable evaluation of impacts, with some areas needing more depth.	Offers basic impact assessment but lacks depth or clear alignment with the project scope.	Minimal or unclear assessment of feasibility and impacts; lacks evidence or justification.
Presentation Quality	10%	Engaging, well-organized, and visually effective presentation; clear communication of key points.	Clear and organized presentation with minor areas for improvement in engagement or visuals.	Presentation conveys key points but lacks engagement or strong visual aids.	Disorganized, unclear, or ineffective presentation; lacks engagement or visual support.
Team Collaboration	10%	Demonstrates excellent teamwork, equal contribution, and effective collaboration throughout the project.	Shows good teamwork and collaboration, with minor imbalances in contribution.	Collaboration is satisfactory, but roles and contributions are unevenly distributed.	Poor teamwork; significant imbalance in contributions or lack of collaboration.

Grading Scale

- **Excellent (90–100%)**: Exceeds expectations with innovative, well-researched, and actionable solutions.
- **Good (75–89%)**: Meets expectations with strong analysis and thoughtful strategies.
- **Satisfactory (60–74%)**: Meets basic requirements but lacks depth, clarity, or innovation.
- **Needs Improvement (<60%)**: Fails to meet key project requirements or demonstrates significant weaknesses.

Notes for Evaluation

- Weight of Criteria: Each criterion's weight reflects its importance to the project's success. Evaluate each area independently and aggregate scores.
- Team Collaboration Assessment: Individual contribution can be assessed through self- and peer-evaluations to ensure fairness.
- Feedback: Provide constructive comments for each criterion to help students understand areas of strength and improvement.

Rubric for Evaluating Case Study Submissions

Criteria	Weight (%)	Excellent (90–100%)	Good (75–89%)	Satisfactory (60–74%)	Needs Improvement (<60%)
Background and Context	10%	Provides a concise, thorough overview of the organization/industry, supply chain process, and sustainability relevance.	Clear description of background and sustainability relevance with minor gaps in detail.	Basic overview with limited depth or vague sustainability context.	Incomplete or unclear background; lacks connection to sustainability.
Sustainability Challenge	15%	Clearly defines the sustainability issue with robust quantification/qualification and links to frameworks.	Defines the issue well, but links to frameworks or quantification are less detailed.	Defines the issue superficially; weak or limited connection to frameworks or data.	Poorly defined issue; lacks data, context, or connection to frameworks.
Stakeholder Analysis	10%	Thorough analysis of stakeholders, their roles, and influence; effectively highlights conflicts or collaborations.	Good analysis of stakeholders with minor omissions or less detailed conflict/collaboration insights.	Identifies stakeholders but lacks depth in analysis of roles, influence, or conflicts.	Minimal or unclear stakeholder analysis; misses key roles or conflicts.
Environmental, Social, or Economic Aspects	15%	Deep and balanced analysis of applicable aspects; identifies opportunities for improvement.	Good analysis of applicable aspects, but missing depth in one or more areas.	Superficial analysis of aspects; misses critical connections or opportunities.	Limited or unclear analysis; lacks alignment with the case's sustainability challenges.
Technological and Operational Innovations	10%	Insightful discussion of innovations with clear relevance and applicability to sustainability.	Adequate discussion of innovations with minor gaps in relevance or application.	Limited discussion of innovations; relevance or applicability is unclear.	Minimal or no discussion of innovations; lacks applicability to sustainability.
Policy and Geopolitical Influences	10%	Detailed and thoughtful assessment of policy and geopolitical impacts; identifies alignment opportunities.	Good assessment of policy and geopolitical factors with minor omissions.	Basic assessment with limited connection to case context or missed opportunities.	Insufficient or unclear assessment of policy and geopolitical factors.
Results and Outcomes	10%	Comprehensive and well-supported discussion of outcomes with benchmarks or standards for comparison.	Good discussion of outcomes, with some reliance on qualitative over quantitative analysis.	Basic discussion of outcomes; lacks evidence or clear comparison to standards.	Minimal or unclear outcomes; lacks benchmarks or meaningful insights.
Recommendations	15%	Practical, innovative, and actionable solutions; includes scalability and long-term considerations.	Good recommendations with minor gaps in innovation, scalability, or feasibility.	Basic recommendations that lack depth, scalability, or alignment with long-term goals.	Poorly developed or impractical recommendations; lacks alignment with sustainability goals.
Reflection and Lessons Learned	5%	Insightful reflection with key takeaways, generalizations, and	Good reflection with minor gaps in takeaways,	Basic reflection with limited depth; missed	Minimal or unclear reflection; lacks meaningful

Criteria	Weight (%)	Excellent (90–100%)	Good (75–89%)	Satisfactory (60–74%)	Needs Improvement (<60%)
		thoughtful future improvement areas.	generalizations, or improvement suggestions.	opportunities for generalization or learning.	takeaways or suggestions for improvement.
Visuals and Data Presentation	10%	Exceptional use of visuals to support arguments; highly engaging and clear.	Good use of visuals; supports content but could improve clarity or engagement.	Basic visuals; relevance is limited or lacks clarity.	Minimal or no visuals; fails to support or clarify arguments.

Grading Scale

- **Excellent (90–100%):** Exceeds expectations with thorough, innovative, and highly effective analysis and presentation.
- **Good (75–89%):** Meets expectations with strong analysis and minor gaps in detail or clarity.
- **Satisfactory (60–74%):** Meets basic requirements but lacks depth, clarity, or innovation.
- **Needs Improvement (<60%):** Fails to meet key requirements or demonstrates significant weaknesses in analysis or presentation.

Evaluation Notes

- **Weight of Criteria:** Allocate points proportionally based on weights; adapt based on case specifics.
- **Feedback:** Provide constructive, actionable feedback for each criterion to guide improvement.
- **Peer Review Option:** Consider peer evaluations to encourage critical engagement and collaboration.