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Develop a course outline on the energy transition for master's degree students in international transport. The course should include 5 modules of 2 hours each. It should begin with a general overview of the main causes of global warming and should then move on to use of oil-based fuels in transport, by the main modes of transport (maritime, air transport, road haulage and rail freight). The course should then survey what is being done in these sectors to reduce their carbon footprint. Finally, the course should conclude with what households and individuals can do to reduce their carbon footprint and more generally lead more environmentally friendly lives.

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Course Title: Energy Transition in International Transport: Towards a Sustainable Future

Module 1: Introduction to Global Warming and Its Causes (2 hours)

- 1.1. Understanding Climate Change: Basics and Definitions
- 1.2. Anthropogenic Causes of Global Warming
 - Greenhouse Gas Emissions: Sources and Impact
 - The Role of Industrialization and Urbanization
- 1.3. Natural Factors and Their Impact on Climate
- 1.4. Consequences of Global Warming on the Environment and Socio-Economic Sectors
- 1.5. Brief Discussion: The Urgency of Addressing Climate Change

Module 2: Oil-Based Fuels in International Transport (2 hours)

- 2.1. Evolution of Oil as the Dominant Fuel
- 2.2. Role of Oil in Maritime Transport
 - Environmental impact
 - Economic dependencies and vulnerabilities
- 2.3. Oil's Dominance in Air Transport
 - Carbon emissions per mile
 - Noise and other pollutants
- 2.4. Oil in Road Haulage
 - Emission statistics
 - Future outlook in the face of EVs
- 2.5. Rail Freight and its Relationship with Oil
 - Efficiency comparisons
 - Prospects for electrification

Module 3: Carbon Footprint Reduction in the Transport Sector (2 hours)

- 3.1. Strategies for Maritime Decarbonization
 - Alternative fuels (e.g., LNG, ammonia, hydrogen)
 - Efficiency measures and ship design improvements
- 3.2. Pathways to Sustainable Air Transport
 - Advanced aerodynamics and lighter materials

- Alternative propulsion (e.g., electric and hybrid systems)
- 3.3. Transitioning Road Haulage to Greener Alternatives
 - Electric trucks and infrastructure
 - Biofuels and alternative energy sources
- 3.4. Advancements in Rail Freight
 - High-speed and maglev trains
 - Electrification and renewable energy sources
- 3.5. Policy Frameworks and Incentives Supporting Transition

Module 4: Grassroots Action: Households and Individuals (2 hours)

- 4.1. Carbon Footprint: Understanding and Measuring Personal Impact
- 4.2. Energy Efficient Homes
 - Home insulation, smart technologies, and sustainable materials
 - Solar panels and decentralized renewable energy systems
- 4.3. Sustainable Mobility for Individuals
 - EVs, bicycles, carpooling, and public transport
 - Behavior change and the psychology of sustainable choices
- 4.4. Food, Waste, and Lifestyle Choices
 - Reducing waste, composting, and recycling
 - Diet and the environment (e.g., plant-based diets)
- 4.5. Community Initiatives and Collaboration: Amplifying Impact

Module 5: Toward an Environmentally Friendly Future (2 hours)

- 5.1. The Interplay of Technology, Policy, and Culture in Energy Transition
- 5.2. The Economic and Social Benefits of a Green Transition
- 5.3. Challenges Ahead: Technical, Financial, and Political Hurdles
- 5.4. The Role of International Collaboration and Treaties
- 5.5. Final Discussion: Envisioning a Sustainable 2050 and Beyond

Assessment and Assignments: Throughout the course, students will be assessed based on group discussions, case study evaluations, individual presentations, and a final project, wherein they will propose a sustainable solution for a transport segment of their choice.

Recommended Readings: A list of core readings, including research papers, articles, and relevant book chapters, will be provided to students for each module, offering deeper insights into the topics covered.

Guest Lectures (Optional): Inviting industry experts and professionals from the transport sector can enhance students' understanding and provide them with real-world perspectives on the challenges and solutions of the energy transition.