Module 4: AI for Sustainable Diet Planning

Module Description

Module 4 focuses on how AI can support diet planning, and whether it is being used as a thoughtful decision-support tool or as a shortcut that hides nutritional, cultural, and environmental trade-offs. Through Vietnamese cases, students learn to assess AI-generated meal plans for nutritional quality, likely carbon footprint, affordability and local relevance.

This module builds directly on Module 3's focus on whole-system trade-offs by shifting attention from products and packaging to diets, choices, and digital decision-making. By learning how to interrogate AI-generated food advice rather than simply accept it, students are better prepared to think critically about how sustainability, health, culture and evidence intersect in everyday meal planning. WHO and FAO's guiding principles are especially important here because they define sustainable healthy diets as diets that are healthy, have low environmental impacts and are adaptable to local social, cultural and economic contexts.

Learning Objectives

- Differentiate between AI as a helpful planning tool and AI as an unreliable substitute for human expertise in diet planning.
- Explain how sustainable diet planning involves nutrition, environmental impact, affordability, and cultural fit.
- Identify the strengths and limits of AI-generated meal plans, especially in relation to accuracy, nutrient adequacy, and complex cases.
- Apply Vietnamese dietary guidance and local food contexts to evaluate or revise AI-generated meal plans.
- Compare diet options in terms of likely carbon intensity, with attention to animal-source foods, plant-based foods, and food waste.
- Design and justify an AI-assisted meal plan that is nutritionally sound, lower in carbon impact, and realistic for a Vietnamese context.

Module 4 Pre-class activities

Purpose: To prepare students to analyse how AI can be used in sustainable diet planning without ignoring evidence, local dietary guidance, or the limitations of automated meal-plan generation. The pre-class work is grounded in precision nutrition, nutrition informatics, sustainable diet principles and current research showing that AI chatbots can be useful for general nutrition advice but are not yet ready for unsupervised use, especially in more complex cases.

Pre-class Activity 1: Choose one article or report from the list below and identify one key idea to help understand food packaging systems in Vietnam.

- Wu, X., Oniani, D., Shao, Z., et al. (2025). *A scoping review of artificial intelligence for precision nutrition.* This review maps the rapid expansion of AI-driven precision nutrition research and highlights the importance of minority and cultural perspectives in future work. https://doi.org/10.1016/j.advnut.2025.100398
- Hieronimus, B., Lopez-Aguirre, M.-L., Birringer, M., & Podszun, M. (2025). *GenAI in nutritional sciences (GAINS): A systematic review and reporting framework for future research.* This review finds that chatbots show promise for nutrition advice but are not yet ready for unsupervised use, especially in complex cases. https://doi.org/10.1016/j.nutres.2025.09.011
- World Health Organization, & Food and Agriculture Organization of the United Nations. (2019). *Sustainable healthy diets: Guiding principles.* This report defines sustainable healthy diets through nutrition, low environmental impact, and local social, cultural, and economic adaptability. https://www.who.int/publications/i/item/9789241516648

Pre-class Activity 2: Short written response to a real-world case

Pick one of the following real-world cases:

Hue City household diets and emissions: a 2025 household-level study in Hue found that animal-based products, especially beef and seafood, were the main drivers of food-related greenhouse gas emissions, while food waste from poor planning and storage also contributed substantial emissions. https://doi.org/10.26459/hueunijns.v134i1S-1.7880

Vietnamese dietary guidelines and menu redesign: FAO's summary of Vietnam's food-based dietary guidelines shows that the country's guidance promotes diverse meals, daily vegetables and fruits, and a balance of vegetable and animal protein, with more fish, shrimp, crab, and beans/peas.https://www.fao.org/nutrition/education/food-dietary-guidelines/regions/countries/vietnam/en/

School meals and healthy food environments in Vietnam: Vietnam's National Nutrition Strategy for 2021–2030 sets targets for more schools to offer meals that meet Ministry of Health recommendations on age-appropriate nutrition and food diversity, and it calls for limits on unhealthy foods in and around schools. https://viendinhduong.vn/storage/app/uploads/public/2025/03/30/ely2022m01d05_qd_02_approving_the_national_nutrition_strategy_for_the_20212030_period_with_a_vision_to_2045.pdf

Pick one of the questions below and write 200–250 words total and post to the online class discussion forum before the session.

- What insight does the reading give students about precision nutrition, sustainable diets, nutrition informatic or AI limitations?
- Is AI most useful here for generating options, comparing alternatives, checking guideline alignment, or not trustworthy without expert review?

- Which stakeholder group is most affected: households, students, parents, dietitians, school managers, app developers or policymakers?
- What would students need to verify manually before trusting the AI output?

Module 4 In-class activities

AI "Prompt and Verification" Workshop

Goal: Use pre-class work to evaluate AI-generated meal plans for nutritional quality, carbon awareness, and local relevance.

In groups, each student should share their answers. Identify any overlaps. Teams select one case and generate or review one AI meal plan.

Verification questions:

- Does the plan align with the nutritional purpose of the case?
- Does it reflect Vietnamese food habits, ingredients and meal structures?
- Does it reduce likely carbon intensity without becoming unrealistic or nutritionally weak?
- What information is missing, overstated or too generic?

Output: Teams identify the top three strengths and top three problems in the AI-generated plan and deliver a 2-minute presentation with justification.

Stakeholder Role-Play: "The Menu Decision Meeting"

Goal: Explore competing priorities in AI-assisted diet planning.

Scenario: A school, clinic, workplace, or household wants to use AI to create healthier and lower-carbon menus, but different stakeholders disagree on what matters most.

Roles: dietitian, student or family representative, sustainability officer, school or canteen manager, policymaker, app developer, budget officer.

Task: Each role argues for or against the proposed AI-supported menu using evidence about nutrition, cost, acceptability, sustainability and trust.

Debrief: Whose perspective dominated? Did the group treat AI as a tool or as an authority? Were carbon reductions prioritized over nutrition, culture or affordability?

Low-Carbon Diet Redesign Challenge

Goal: Connect AI meal planning to Vietnamese dietary guidance and sustainability trade-offs.

Group task: Teams take one case from pre-class work and propose:

- one way to improve nutritional quality
- one way to lower likely carbon impact
- one way to improve cultural fit, affordability, or feasibility

Output: A one-page revised meal-plan sheet with 1-2 recommendations showing how the AI-generated plan should be improved before real use.

Post-class Reflection

Students respond to the prompt: **"When does AI improve diet planning, and when does it oversimplify health, culture or sustainability?"**

Students write one key insight and one lingering question for the next stage of the course.

This reflection encourages students to distinguish between useful assistance and misplaced trust. It also reinforces that lower-carbon diet planning should still be evidence-based, nutritionally sound and locally appropriate rather than optimized by automation alone.