FOOD WASTE INNOVATION CHALLENGE
COURSE SYLLABUS

Create Innovative Solutions to Society's Complex Challenges

Instructor: Program Lead: New York Academy of Sciences
Course Time & Format: 10 weeks; approximately 2-4 hours weekly
Format: Blended; Online
Age Level: 13 - 17 years old

COURSE DESCRIPTION & OBJECTIVES

Innovation Challenges are an introduction to foundational concepts of design thinking with an emphasis on developing and testing new solutions to society's greatest challenges. The Food Waste Innovation Challenge requires students to work in self-selected, distributed teams, requiring cross-cultural communication, dynamic problem solving, deep critical thinking related to society, leadership and project management skills.

Students must first identify their project team and then work together with a mentor to apply design thinking processes to approach the real-world health problems of air pollution in an innovation challenge with the Junior Academy. While each student must identify their own role within the team, together they will learn how to identify and map out a real problem and ways to build and test solutions quickly through an iterative, scientific approach. This course requires extensive student collaboration and regular engagement through The Academy's Junior Academy and its online platform, Launchpad.

THE CHALLENGE

A United Nations study recently found that over 1 billion meals are wasted each day. Estimates suggest that about one third of all food is wasted in its journey from farm to fork. This statistic is especially distressing when paired with the fact that over 700 million people go hungry across the globe each day. Food waste contributes to around 9% of global greenhouse emissions and accelerates biodiversity loss, due to its unnecessary utilization of nearly a third of the world's agricultural land. Reducing food waste is a very fixable problem. Successful solutions could address one or more of the spaces where food waste occurs. In wealthier nations, much of this waste occurs at the household (60%), restaurant (28%), and retail (12%) levels. In developing nations food waste occurs at the household level as well as at harvest time. Poor storage options allow for pests and mold to destroy crops. In other cases crops rot in the field for lack of

technology or market demand. What technological or social innovations could address food waste where it happens? How could these solutions specifically minimize world hunger, greenhouse emissions, and/or biodiversity loss?

Student Challenge: **To design an innovative, scalable solution that helps reduce food waste at the local level (household, local restaurants, retail) or at the regional level (agriculture), while promoting sustainability, equity, and responsible consumption.**

Students will work collaboratively to consider the following when designing their teams' solution:

- What type of food waste will your solution address?
    - Household waste? Restaurant or grocery waste?
    - Specific foods such as fresh vegetables? Meat? Dry goods?
    - Specific harvests or regions?
    - Something else?
- How can your solution be available to and adopted by the entire community?
- How will you approach the problem? Will you take a technology approach or a social approach?
- How can your solution address equity issues in food availability?
    - How might you integrate community co-design into your solution?
    - How might your solution be scaled to impact other regions or other countries?
- How can you keep the cost of your solution low enough to encourage implementation?
- How sustainable is your solution?
- What region or community might your solution impact the most?
- What public policy might be needed to support or implement your solution?
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LEARNING OBJECTIVES

INNOVATION CHALLENGE LEARNING OBJECTIVES *At the end of this course, students will be able to*:

- Develop critical thinking and problem-solving skills through brainstorming techniques to develop ideas and design a solution to a complex problem.
- Develop their own arguments and analyze competing perspectives to a complex problem with supporting evidence.
- Develop a deeper, personal civic identity and clearly identify their role in their community.

- Develop a solution that could play a part in transforming a specific societal need regarding a larger issue that is transferable to a specific community and larger global community.
- Use data and insights of an inquiry to answer a research question using scientific terms in charts, tables, or graphs.
- Utilize a social justice lens when applicable to interpret the data and critically think about which groups are not represented around decision making.
- Effectively communicate ideas, data and insights using various forms of media.
- Effectively collaborate with team members with empathy and mutual respect, and develop an expanded perspective about how people from other countries see the world.
- Effectively communicate challenge specific variables that impact the environment, society, and economy including examples of the effect on local communities.
- Understand how to apply Design Thinking methods to understand what users need, and how to develop solutions to meet those needs.
- Learn how to actively listen, work through any disagreements, and solicit input from people in creative ways to generate new ideas.
- Learn how to test ideas and develop rapid prototypes.
- Identify corresponding careers connected to Innovation Challenge.

COURSE OUTLINE

TIME	TOPIC	ASSIGNMENTS	FORMAT
Week 1	• Getting Started w/Junior Academy • Onboarding	• Join Launchpad Platform • Review Junior Academy Orientation • Attend Virtual Kick Off Week • Complete Course Pre-Survey	Individual
PHASE 1 Challenge Team Formation			
Week 2	Challenge introduction • Background on your Challenge • Finding Mentors & Experts • Reaching out to experts	• Complete Required Weekly Reading • Engage in Launchpad Discussions • Complete activities found in resource library	Collaborative
Week 3	Team Building • Forming Your Team • Holding a Virtual Team Building • Creating a Team Comm's Plan	• Engage in Launchpad Discussions • Hold 1st Team Meeting • Complete Required Weekly Reading • Due Milestone #1: Team Dynamics	Collaborative
PHASE 2 Research, Brainstorm & Plan			

Week 4	Researching • Gathering relevant and diverse materials, articles, books, and sources • Developing research questions and interviewing	• Engage in Launchpad Discussions • Engage/Meet with your Team • Complete Required Weekly Reading	Individual Collaborative
Week 5	Brainstorming • Team Concept Brainstorm • Develop How "Might We" Ideas • Building Team Empathy	• Engage in Launchpad Discussions • Engage/Meet with your Team • Complete Required Weekly Reading	Collaborative
Week 6	Design & Plan • Categorizing & Bundling Ideas • Deciding & creating your concept • Developing a user testing plan	• Engage in Launchpad Discussions • Engage/Meet with your Team • Complete Required Weekly Reading • Due: Milestone #2: Design & Test Plan	Individual Collaborative
PHASE 3 Build, Test & Analyze			
Week 7	Build • Creating a Prototype • Build storyboard & journey map • Identifying your variables • Rapid Prototyping	• Engage in Launchpad Discussions • Engage/Meet with your Team • Complete Required Weekly Reading	Collaborative
Week 8	Test & Analyze • Conducting User Testing • Getting User Feedback • Analyzing your data Results	• Engage in Launchpad Discussions • Engage/Meet with your Team • Complete Required Weekly Reading • Due: Milestone #3 Analyze Results	Collaborative
PHASE 4 Iterate & Develop Final Projects			
Week 9	Iterate • Modifying your concept design based on your results • Refining & re-test your prototype	• Engage in Launchpad Discussions • Engage/Meet with your Team • Complete Required Weekly Reading	Individual Collaborative
Week 10	Develop Final Project • Creating draft of Final Project • Project Feedback & revision • Submitting Final Project • Complete Course Post-Survey	• Due: Executive Summary • Due: Final Team Presentation • Due: Personal Reflection • Complete Course Post-Survey	Individual Collaborative
New York Academy Challenge Final Project Review & Grading			

COURSE ASSIGNMENTS	**% of FINAL GRADE**

Milestone #1: Team Dynamics: This assignment is focused on team building and planning for how students will work together.	10%
Milestone #2: Design & Test Plan: This assignment is focused on the Team's proposed solution, hypothesis and test plan.	10%
Milestone #3: Build, Test & Analyze: This assignment is focused on building, testing and analyzing data related to your solution.	10%
Team Collaboration & Online Engagement throughout course	20%
Final Presentation, Executive Summary & Personal Reflection Final Presentation Rubric	50%
(100%) **Final Grade**	

GRADING POLICY

Late-work policy: Milestones 1-3 are allowed to be submitted late for point deduction. Late submissions of the Final Solution Presentation for this course will not be accepted after the due date unless previously arranged with **the Academy** for extenuating circumstances. It is important to stay up-to-date on assignments since much of the work builds on previous assignments and will impact students' ability to be effective in providing solutions for their teams' projects.

Re-grade policy: If a student thinks there has been a technical error in the grading of an assignment, they should email program administration at the Academy within one week of receiving the graded assignment, otherwise the assignment will not be regraded. Feedback is provided upon request.

REQUIRED READING LIST

Students are expected to read and refer to a wide variety of texts throughout this course; all of which can be found in the Launchpad Resource Library.

Please see a sample of the Resource Library reading list for this challenge:

Week 1

Launchpad Platform, Launchpad

Junior Academy Orientation, Launchpad

Week 2

Food Waste Challenge Background, Launchpad

Air Pollution, World Health Organization (WHO)

Air Pollution: Everything You Need to Know, NRDC

Week 3

What is Human Centered Design?, Video Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Design Thinking for Problem Solving, Video Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Week 4

World squanders over 1 billion meals a day - UN report

The world wastes more than 1 billion meals every day as hundreds of millions go hungry (Supply Chain Project)

5 facts about food waste and hunger (World Food Programme)

Why is one-third of our food wasted worldwide? How stopping food waste can help feed a growing population (UC Davis)

Food Loss and Waste Reduction in the Near East and North Africa (FAO of the UN)

Food Loss and Waste Reduction in the Near East and North Africa (video)

The State of Food Waste in West Asia (UN)

Driven to Waste: The Global Impact of Food Loss and Waste on Farms (WWF)

Expiration, Use-By and Sell-By dates: What do they really mean? (University of Connecticut)

U.S. school cafeterias waste more food than those in other developed countries (Penn State)

Buying in Bulk Creates More Waste (PBS)

Retailers: Solutions for Grocery Waste (ReFed)

Van Rooijen, M.A. , J.C. Gerdessen, G.D.H. Claassen, S.L.J.M. de Leeuw Optimizing household food waste: the impact of meal planning, package sizes, and performance indicators, *Resources, Conservation and Recycling*, Volume 205 (2024)

Food Waste and Solutions for Combating the Crisis (University of Maine)

UC Davis Food Loss and Waste Collaborative

Schools Can Be Our Nation's Largest Food Waste Champions (ReFed)

Tackling Food Waste in Cities: A Policy & Program Toolkit (Second Edition) (NRDC)

Reducing Consumer Food Waste Using Green and Digital Technologies (UN)

Mmereki D, David VE, Wreh Brownell AH The management and prevention of food losses and waste in low- and middle-income countries: A mini-review in the Africa region, *Waste Management & Research*, 42(4):287-307 (2023)

Interviewing Experts, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Interviewing Individuals, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Interviewing Groups, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Week 5

How Might We, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Brainstorming Rules, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

How to Facilitate a Brainstorm, Stanford D School, 2020

Week 6

Bunding Ideas, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Doing a Gut Check, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Creating a Concept, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Week 7

Determine What to Prototype, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Rapid Prototyping, Design Kit, Innovation, Design, Engineering & Organization (IDEO)
Prototype to Test, Design Kit, Innovation, Design, Engineering & Organization (IDEO)
Identify a Variable, Design Kit, Innovation, Design, Engineering & Organization (IDEO)
Storyboards & Journey Maps, Design Kit, Innovation, Design, Engineering & Organization (IDEO)
Tinkercad, Autodesk

Week 8

Get Feedback, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Testing with Users, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

Research Methods, Launchpad

Week 9 - Week 10

Integrate Feedback & Iterate, Design Kit, Innovation, Design, Engineering & Organization (IDEO)

How to Create a Presentation, Launchpad

How to Create Video Presentations, Movavi
Presentation Guidelines, Launchpad