Instructor: David Donnan MBA, P.Eng.
Partner Emeritus, Kearney; President Silvertip Management
https://isen.northwestern.edu/david-donnan
Email: david.donnan@northwestern.edu
Office Hours: Monday 4pm-5pm (via Zoom).-Alternate times available, please contact

NU Faculty Sponsor: Dan Chen, Kellogg and Principal & Chairman, Equilibrium Capital

Class Room: Via Zoom for five weeks, please note that all class session through Zoom will be recorded and uploaded with transcription to the Canvas course website

Class Timing: Tuesday, Thursday, 4:20 – 5:50 pm (October 22nd – November 24th, Final 5 weeks of quarter)

Pre-requisites: Students must have successfully completed ISEN 471 Sustainable Food (offered Fall Quarter, first 5 weeks) or have the equivalent experience as approved by the instructor.

Course Synopsis: This class will investigate the future of food systems including changes in production, transportation, processing and consumption of food. It will focus on upcoming challenges and opportunities in the world of food and agriculture and the role of economics, policy, technology and climate impact. Growing and changing consumer demand, supply chain disruptions (including COVID-19 impact), modifications in farming practices, food and Agtech impact and more will shape the future of food. Additionally, instructor will address the increased focus on sustainability, the influence of investors and the impact of market disruptors.

Course Goals: Students will build knowledge on the multitude of stakeholders in today’s food industry, disrupting forces in the food supply chain, and what changes we can expect in the future:

- **The Challenges to the Global Food System**: Students will learn about the global food systems and how they are changing to meet increased population, shifting consumer diets and constrained food supply due to climate change, trade disruptions and disease. They will be able to determine the key factors that will impact our ability to feed the world.

- **Public Policy and Social Impact**: Upon reviewing the key food regulatory authorities as well as the impact of NGO’s on public policy and food access, the students will understand the complex interplay between government, NGO, industry and advocacy on the food system. An analysis of global policy issues such as food security, nutrition and health, international trade, farm economics and social equity will be discussed.

- **Food and Agricultural Technology**: Sustainable food production is the focus of innovators and entrepreneurs in food and Agtech. Students will learn on how different technologies such as plant-based proteins, vertical farming and gene editing offer better
food production capabilities but also may create unexpected consequences for food access and affordability.

- **Food Production and Supply Stress Points**: Students will learn about the global food industry giants, their quest for efficiency and low cost and how the supply chain systems were disrupted during the pandemic. A discussion on the future food systems architecture will highlight the changes needed in our food systems.

- **Investments & Innovation in Food and Agriculture**: Venture Capital, incubators and accelerators have introduced new levels of innovation into farming and food manufacturing. Students will determine how new companies can attract capital and the successes and failures of new investments

Students are expected to complete readings prior to class. Please refer to the reading list for primary texts that will be used for the class. There will also be supplemental readings and films including articles and essays, that will be provided by the instructor. As part of the class, we will have a series of guest lectures by stakeholders that work in agriculture, food systems, policy and the investment community.

**Grading/Assessment**:

Grading will be based on the following rubric:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Details</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Write Ups</td>
<td>60%</td>
<td>Three 2-3 page (single space) write ups (800-1200 words) on key questions from case studies. Students will submit their write-ups before the class discussion session. Late submissions must be pre-approved otherwise marks will be deducted.</td>
<td>Week #2, #3, #4</td>
</tr>
<tr>
<td>Final Paper</td>
<td>30%</td>
<td>Final paper (8-10 pages) that includes an analysis that relates to the future impact of policy, technology and investment on food systems and sustainability. For example, a student may choose to look at the impact of the investment community in plant-based proteins. The analysis would look at the investors in the sector, the companies they are investing in and the potential impact of their investments on environmental and sustainability measures. An analysis of regulatory and policy implications and potential technology applications would also be considered. Students should provide a recommendation to any changes in policy or investment thesis to provide better outcomes. Students must confirm their final paper topic with</td>
<td>At the completion of Week #5, intermediate deadline at Week #4</td>
</tr>
</tbody>
</table>
the instructor by the beginning of Week #4. The paper is due at the completion of week #5 class.

| Preparation, Participation and Effort | 10% | Based on attendance and instructor assessment of preparation and participation in class on a weekly basis. There will be ample opportunity for students to answer questions in class. Students are expected to prepare and research the guest speakers in the class and prepare suitable questions. There may be unannounced quizzes on the readings which students should be prepared to discuss. | Ongoing |

**Grading Policy:** Grades will be assigned based on all the work you have completed during the quarter following the traditional practice of the following Grade scale:

Percentage 93-100  90-92.9  87-89.9  83-86.9  80-82.9  77-79.9  73-76.9  70-72.9  60-69.9 <60

<table>
<thead>
<tr>
<th>Grade</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
</table>

- *It is expected that all work submitted for this class is original work of the student submitting.* All suspected violations will be reported to the McCormick College of Engineering’s Dean’s Office in accordance with the NU Academic Integrity Policy.
- *Late assignments will be accepted with extenuating circumstances, you must receive approval from the instructor prior to the submission due date.*

**CLASS OUTLINE**

There will be no final exam for this class, but final paper will be due on scheduled final exam date.

<table>
<thead>
<tr>
<th>Weekly Topic</th>
<th>Description</th>
</tr>
</thead>
</table>
| **1: The Future of Food - Increased Demand and Constrained Supply** | This module will introduce students to the fundamental global question “Can We Feed the World?”
- It will discuss the global need for more food and agriculture based on population growth, changing diets, increased protein consumption and the fight against malnutrition
- Constraints to our future food supply will be discussed such as climate change, soil health, biodiversity and political/trade disruptions and their impact on global food production
- A discussion on nutrition and food security and hunger will be discussed and the implication on global food systems |
<table>
<thead>
<tr>
<th>Section</th>
<th>Topics</th>
</tr>
</thead>
</table>
| 2: Food Policy and Social Impact | - A review of current regulatory agencies in US, Europe and global (FDA, USDA, FAO, WHO, etc.) and their impact on food production and distribution.  
- A discussion on social impact of food policies such as hunger and food security, nutritional guidelines, farming methods and environmental impact, food waste and potential solutions.  
- Analyze the impact of poor nutrition and food security on GDP and economy |

**Class discussion:**  
Discuss the trade-offs between various policy positions such as food security, nutrition, environmental, poverty. What are the unintended consequences of recent policy decisions?  

**CASE STUDY A:** *Nestle Creating Shared Value (CSV)*

**Guest Lecturer Panel:**  
Jeanne Blankenship, VP Policy and Advocacy Academy of Nutrition and Dietetics,  
Lisa Moon, CEO Global Food Bank Network

<table>
<thead>
<tr>
<th>3: Future Food Systems Innovation</th>
<th>Topics</th>
</tr>
</thead>
</table>
| Guest Lecturer: PLENTY, Mighty Vine, Beyond Meat | - A review of current issues in the food system, implications and potential solutions  
  - Livestock’s impact on environment – alt meat and plant-based proteins  
  - Access to water – Hydroponic and reduced water systems  
  - Genetic modifications= CRISPR technology and GMO’s  
  - Environmental impact of farming – No till farming, precision farming, silvopasture, and Agtech  
  - Biodiversity – Underutilized species, crop diversity.  
  - Extended shelf life - HPP, MAP, Local foods  
  - Nutritional impact – biofortification, NOVA  
- Issues and Trade-offs  
  - Consumer advocacy and food justice  
  - Impact of technology on food  
- A discussion on consumer’s impact and advocacy for new food systems |

**Class Discussion**  
What technologies do you think will have the biggest impact on sustainability efforts? GHG? Water usage?  
What policy changes are needed to accelerate the adaptation of these technologies?
### CASE STUDY B: Vertical Farming

**Guest Lecturer:**
Nate Story, Founder PLENTY

### 4: Supply Chain Evolution and Revolution

A review of current food supply chain
- Assessment of current players in global food supply chain
- Global risks in supply chain
- Concentration of power and risks

Potential disruptions to the system are studied
- Pandemics and disease
- Global Trade
- Environmental catastrophes

An analysis of potential solutions to disruptive forces will be conducted to see what economic and social tradeoffs exist.

**Class Discussion**
What are the vulnerabilities in the current supply chain

### CASE STUDY C: US Retail During Pandemic

Select case for final submission by first class of week

**Guest Lecturer:**
Luke Saunders, CEO Farmers Fridge

### 5: Investments in Food and Foodtech, Agtech and Innovation

Overview of Investment Community in Food & Agriculture
- Key Players
- Methods of Funding
- Major Investments and how they are changing – Corporate ventures, VC funding
- Accelerators and Incubators

**Class Discussion**
Given what we learned about the global food systems, opportunities and impediments and post COVID19 environment
- What will be the most promising technology investments in the next 5, 10 and 20 years?
- How will food systems, consumer choice and companies change in the next 10 years?
How will the forces of advocacy and policy interact to combat malnutrition, food security, sustainability and social justice?

**Final Paper Due**

**Guest Lecturer**
Aaron Rudberg, COO S2G Ventures
Mike Lee, C0-Founder Alpha Food Labs

There will be no final exam for this class, there is a final case study.

Throughout the quarter, students will be required to view videos outside of class time.

**Required Course Readings** *(subject to change)*:
Materials available on Canvas [https://canvas.northwestern.edu/](https://canvas.northwestern.edu/)

**Week 1:**
- **UBS The Food Revolution.**
- Bitman, Mark “Don’t Ask How to Feed the 9 Billion” NYT, Nov 12 2014
- **Shifting Diets for A Sustainable Food Future**, World Resources Institute, April 2016
- **National Geographic Feeding 9 Billion People**
- Baldwin, Richard “A Short History of Agricultural Revolution” VoxEU
- How the Supermarket Helped America Win the Cold War, *Freakonomics*

**Case Study:**
- No case study assignment

**Week 2:**
1. Regulations of the US Food Industry, NDSU [https://www.ag.ndsu.edu/foodlaw/safe-408-608/foodprocessingregulation](https://www.ag.ndsu.edu/foodlaw/safe-408-608/foodprocessingregulation)
5. The Innovation revolution in agriculture, Chapter 7, Donnan, D

**Optional Additional Reading:**

**Case Study:**
- Case Study A: **Nestle Creating Shared Value (CSV)**
Week 3:

- Agriculture 4.0, Oliver Wyman from https://www.mmc.com/content/dam/mmc-web/insights/publications/2018/november/agriculture-4-0/Oliver-Wyman-Agriculture-4.0.pdf
- Digitising Agrifood, Barilla Center for Food & Nutrition
- How Will Cultures Meat and Meat Alternatives Disrupt the Agricultural and Food Industry, Donnan, Kearney 2019
- Vertical Farming at PLENTY (Video) https://www.youtube.com/watch?v=fb4xcFw2VMg&t=1s

Case Study
- Case Study B: Vertical Farming

Week 4:

- Food Supply Chains During COVID19, NCBI, Hobbs, Jill E. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7264576/

Case Study
- Case Study C: US Retail During Pandemic

Week 5:


Case Study:
- No case study assignment

Additional Optional Reading

Goel, Akash. The Food System is Killing Americans. CNN


Videos and Movies


Food Fight This film tells the story of the California food rebellion against big agribusiness to launch the local organic food movement.

Food Inc. Food Inc exposes the deep and unknown parts of the American food system – especially factory farming – and how it impacts our health, farming and the environment.

King Corn: Two college best friends go on a road trip to America’s heartland to learn about where their food comes from. What they discover – that everything is made from corn – shocks them.

Caffeinated: Focusing on the social and cultural components of the coffee supply chain, “Caffeinated” takes viewers on a journey from the farmers responsible for growing a perfect bean to the roasters and baristas responsible for brewing a perfect cup.

Wasted: The Story of Food Waste: From chef and television personality Anthony Bourdain, “WASTED! The Story of Food Waste” explores both the problem of food waste in the U.S. and possible solutions from around the globe.

Relevant Websites for Networking and Career Interests

Food Navigator, https://www.foodnavigator.com/ (also available through NU library)

Food Tank, https://foodtank.com/

Alpha Food Labs, https://www.alphafoodlabs.com/

Civil Eats, https://civileats.com/

The Good Food Institute, https://www.gfi.org/

Naturally Chicago, https://naturallychicago.org/


Center for Food Integrity, https://foodintegrity.org/

Consultative Group for International Agricultural Research, https://www.cgiar.org/
Instructor may also assign a number of industry news services to discuss timely/current updates in markets design and regulation that are illustrative of core course topics.

**Northwestern University Policies & Resources:**

**Academic Integrity**
Academic integrity is taken very seriously at Northwestern. Students are responsible for reading and understanding Northwestern’s Academic Integrity policies. All suspected violations will be reported to the McCormick College of Engineering’s Dean’s Office. These include: cheating, plagiarism, fabrication, unfair advantage, unauthorized collaboration, and aiding and abetting of academic dishonesty. Students found in violation of academic integrity may receive a zero on the assignment or a failing grade for the course, and may be suspended or permanently expelled from the University. See [Academic Integrity: A Basic Guide](#) for more information.

**AccessibleNU and Disability Accommodations**
Any student requesting accommodations related to a disability or any other condition is required to register with AccessibleNU (847-467-5530) and provide professors with an accommodation notification from AccessibleNU, preferably within the first two weeks of class. All information will remain confidential. See the [AccessibleNU website](#) for more information.

**Illness and Medical Leave of Absence**
Review the University’s [policy](#) on missing academic work due to illness. Your instructor cannot waive an assignment missed due to illness unless she can verify your illness with Health Services.

**Discrimination and Sexual Harassment**
Northwestern’s Policies on Discrimination, Harassment, and Sexual Harassment apply to all members of the University community, including students, staff, faculty, and third parties. Any student, staff, faculty member, or third party who believes that they have been discriminated against or harassed on the basis of their race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, pregnancy, parental status, marital status, age, disability, citizenship, veteran status, genetic information or any other classification protected by law, should contact the Office of Equity at (847) 467-6571. Additional information about the University’s discrimination and harassment policies, including the campus resources available to assist individuals with discrimination or harassment concerns, is available online on the [Office of Equity Website](#). Students, staff, and faculty who report harassment, discrimination, or sexual misconduct are also protected under the [University’s Policy on Non-Retaliation](#).

**Sexual Misconduct and Reporting**
Northwestern University is committed to fostering an environment where students are safe and free from sexual misconduct. Confidential resources are available to those who have experienced sexual misconduct. Faculty and instructors are not confidential resources and are required to report incidents of sexual misconduct, whether discussed in your assignments or in person, to the Office of Equity, which can provide information about resources and options. We encourage students who have experienced sexual
misconduct to talk with someone to get support. For more information, including how to request interim protective measures and academic accommodations or file a complaint, see the Get Help page.

**Other Resources**
Students can find useful resources for safety and security, academic support, and mental and physical health and well-being at the [NUhelp website](#).