UBC Master of Food and Resource Economics
2024-2025

MFRE 2024-2025
Term 2 Courses Outline

2024 - 2025 T2 Course Info- Session

MFRE COURSE REQUIREMENTS

MFRE students are required to complete **32 credits** from the following FRE graduate courses

- Term 1: Core Courses: FRE 501, FRE 502, FRE 516, FRE 528: (12 credits)
- Term 2: Select from MFRE electives (12 credits)
- Term 1 & 2: MFRE Seminar Series FRE 520 (2 credits)
- Term 3: Graduating Project FRE 547 (6 credits)

IMPORTANT DATES

- November 27, 2024: Internal deadline for registering for all term 2 courses (both parts of the term).
- January 17, 2024: deadline to add/drop all term 2 courses with a W standing

SELECTING COURSES OUTSIDE OF MFRE ELECTIVES

If any student has reason to vary from the Term 2-course requirements, either by taking a non-MFRE course or by taking additional credits (i.e., more than 12), they need to request approval from the Academic Director via the following process:

- Complete the Term 2 Course Plan Approval Form (Link available on Portal)
- Email the completed form to **Olivier Ntwali, MFRE Academic Program Manager**.

You will be contacted regarding the decision.

Electives courses timelines

January- February (half term courses)

- Courses: FRE 523 (1.5), FRE 518(1.5), FRE 521E(1.5), FRE 531(1.5) , FRE 521F(1.5), FRE 505 (1.5).

February to April (half term course)

- Course: FRE 527 (1.5), FRE 529(1.5), FRE 521D(1.5), FRE 530(1.5), FRE 517(1.5)

January to April (Full term Courses)

- Courses: FRE 585 (3), FRE 515 (3)

TERM 2 (12 CREDITS) – ELECTIVE COURSES & CONCENTRATION

Course Selection: Students have the flexibility to tailor their program by selecting elective courses that align with their individual interests and career goals. you can choose **four courses** from a specific concentration within the MFRE program to deepen their expertise in one of the following areas.

- **Strategic Business Management in the Food and Resource Sector**: This concentration equips students with **critical skills to navigate the complexities of the food and resource sectors**. With courses covering topics such as survey analysis, supply chain economics, ESG principles, business analytics, commodity futures trading, and agribusiness management, students are prepared for leadership roles that address both environmental and economic challenges.

    - Courses: **FRE 518, FRE 517, FRE 515, FRE 521E, FRE 521D, FRE 521F**

- **Data Analytics in Environment and Food**: The Data Analytics concentration focuses on **harnessing data-driven insights to inform decision-making in the food and resource sectors**. Students will take courses in time series analysis, environmental data analytics, advanced econometrics, and quantitative methods, gaining the skills necessary to solve issues related to food security, resource management, and environmental sustainability.

    - Courses: **FRE 527, FRE 521D, FRE 530, FRE 585, FRE 529**

- **Economic Modelling in Environment and Food**: This concentration provides students with the tools to **analyze economic systems within the food and resource sectors**. Through rigorous courses in econometric modeling, resource economics, supply chain analysis, and environmental policy, students are equipped to address key challenges such as sustainability, resource management, and technological innovation.

    - Courses: **FRE 523, FRE 521E, FRE 526, FRE 530**

- **Policy Analysis for the Food and Resource Sector**: The Policy Analysis concentration offers a comprehensive framework for **understanding and evaluating the effects of policy in the global food and resource industrie**s. With coursework in environmental economics, global governance, agricultural policy, and economic development, students gain the expertise to effectively shape and assess policy decisions in these critical sectors.

    - Courses: **FRE 526, FRE 531, FRE 505, FRE 521F**

FRE 523 (1.5) Resource Economics I: Economics of World Fisheries.

Instructor: Dr. Gordon Munro & Dr. Rashid Sumaila

The course will cover the **Economic Management of Capture (wild) Fisheries and Aquaculture from a world perspective**. These fi sheries, world- wide, provide employment for not fewer that 120 million persons. Most of the time in the course will be devoted to wide fisheries, which like the atmosphere, provide a striking example of a "common pool" resource. "Common pool" resources are notoriously difficult to manage effectively.

Learning Outcome

- The fundamental recognition that world fi sheryresources, like all other natural resources, are a form of natural capital. The economic management of these resources is thus a problem of asset management through time, under conditions of irreducible uncertainty
- The theory and practical management of capture fi shery resources at the national level
- The theory and practical management of capture fi shery resources at the international level. At least one third of commercially exploitable capture fi shery resources are accounted by those which are internationally shared.
- The linkage between management of capture fishery resources at the international and national levels.
- The effective management of aquaculture resources, which involves, inter alia, the linkages and conflicts between these resources and wide fishery resources

REAL-WORLD APPLICATIONS IN CLIMATE, FOOD & ENVIRONMENT

- The single most important big question that the course will address is that of sustainability. Achieving sustainable exploitation of a "common pool" resource, such as capture fishery resources, is an ongoing and very diffi cult challenge.
- Climate change is another question enters in, in that climate change intensifi es the diffi culty of managing world fi shery resources, particularly at the international level

FRE 517 (1.5) Futures Tradingof Commodities.

Instructor: Jacqueline Wong

This course explores **the use of risk management tools in the lumber commodity and foreign exchange markets**. In the context of these two markets, students will get a practical understanding of **using futures and options to hedge and to speculate**. The course will begin with knowledge of the lumber cash market and how the various players use futures to hedge their cash positions. We will then follow the life of a futures trade to compare futures and cash pricings; this overview will subsequently form the foundation to understand basis in futures trading. In the next stage, we will incorporate foreign exchange risks in international trade and take a look at other derivative products. As the course progresses, students will integrate and build upon concepts and skills from this and different courses in order to manage practical problems at hand. Class participation will be encouraged to simulate a trading floor where ideas and information are openly discussed.

LEARNING OUTCOMES

1. Describe macroeconomic factors that affect supply and demand in domestic and global markets and the subsequent effects on commodity pricings.
2. Understand how commodities are traded in cash markets, explain the risks involved and be able to apply options and futures to manage these exposures.
3. Identify basis opportunities and express the views through futures and options trades.
4. Analyze the pros & cons of various hedging strategies in the perspective of different market players along the supply chain as well as that of the investment community.
5. Evaluate and explain the dynamics of speculation vs hedging in the futures market that determine futures pricing.

Integrate data (such as spreads) & current market information with pricing analysis and forecasts to make informed hedging / speculative decisions

BIG QUESTIONS & REAL-WORLD APPLICATIONS IN CLIMATE, FOOD AND THE ENVIRONMENT

- What is the role of commodity markets in global trade, food security, and risk mitigation?
- What are the differences between theoretical and practical applications in Futures & Options Trading? How does the futures and cash markets contribute to pricing analysis and forecasting in commodities?
- What are the dynamic and opportunities of speculation vs hedging in the futures market? .
- How does trading currency futures (also known as an FX future or foreign exchange future) differ from trading commodities?

FRE 515 (3) Agribusiness Management.

Instructor: Dr. Karen Taylor

This course is designed **to further develop and analyze concepts learned in FRE 516 and apply them in a practical context with real-life examples in the agriculture, food and resource sectors**.

This is done as a combination of **in-class lectures** and **site-visits** in the Lower Mainland so students can see first-hand agribusiness in action! Topic coverage includes financial statement analysis and how it is used by owners, investors, lenders, and industry stakeholders to make decisions. We discuss how to value a business in terms of its assets, earnings, cash flow, and market factors. Students learn in depth about the real-world financing of agribusinesses, sources and uses of capital, and how sustainable finance is currently utilized. We discuss various production management techniques (JIT, LEAN, vertical integration, etc.), and what successful leadership looks like. The class will dive into what is recently occurring related to sustainable finance and how lending and businesses are preparing and learning to adapt to upcoming changes related to climate-change and sustainability reporting. We will also delve into how Artificial Intelligence (AI) is being used in the agriculture and food sectors, as well as by banks.

LEARNING OUTCOMES

1. Analyze financial statements, calculate key ratios and utilize findings to make informed management decisions.
2. Assess an agribusiness's value using EBITDA, Cash flow, Enterprise Value, and Discounted Cash Flows for purchases, sale, or financing decisions.
3. Examine agribusiness financing and sustainability finance by identifying capital sources and explore how sustainable finance is shaping the agribusiness market.
4. Learn from real-world agribusiness examples by applying concepts from case studies and site visits to actual agribusinesses, gaining insights from industry leaders on production management, sustainable practices, and the challenges of operating successful agribusinesses.

BIG QUESTION & REAL-WORLD APPLICATIONS IN CLIMATE, FOOD AND THE ENVIRONMENT:

1. How is an agribusiness analyzed to make strategic decisions, to determine value, and ensure future sustainability?
2. How are firms, investors, and lenders going to tackle climate-change and sustainability together?

FRE 526 (1.5) The economics of environmental policy: Lowering costs to achieve our climate and conservation targets

A key economic principle for environmental policy is cost effectiveness: that is policy should minimize the cost of achieving its objective. Another key principle is the recognition of how we trade-off current and future net-benefits when we make policy decisions. We will use a simple framework to understand the concept of cost-effectiveness of policy, and inter-temporal optimization in environmental regulation.

We then apply this framework to the defining issue of our time, climate change. We describe society's optimal emission of greenhouse gases (GHGs), and evaluate (theoretically and in practice) two commonly employed policies for GHG reduction: carbon taxes and cap and trade. In addition to their cost- effectiveness, we also evaluate these policies for other desirable policy properties such as their impact on equity. We similarly evaluate policies used to regulate natural resource extraction.

LEARNING OUTCOMES

1. To understand how to lower the costs for meeting environmental goals in a society of heterogenous actors.
2. To recognize the implicit intertemporal economic tradeoff underlying the use and regulation of natural resources.
3. To determine the relative merits of different environmental policies—market-based or other regulatory solutions—in various contexts.

BIG QUESTIONS & REAL-WORLD APPLICATIONS IN CLIMATE, FOOD AND THE ENVIRONMENT COVERED IN THE COURSE

1. What policies are in use to regulate climate emissions across the world today?
2. How can one evaluate the merits of some major economic policies regulating climate emissions?
3. What policies are employed to regulate natural resource extraction
4. How is the principles of cost-effectiveness influencing newer policies being employed recently?

FRE 530 (1.5) Time Series Analysis.

Instructor: Dr. Kurt Niquidet

This course will introduce students to **the basic techniques of time series econometrics and will investigate both univariate and vector processes in time series models**. The goal of this course is to provide students with sufficient understanding and application of time series methods to be comfortable working within a modelling environment (i.e., forecasting roles, food and resource macroeconomic studies, etc.) that deals with time series analysis. A variety of models and analytical methods will be investigated in this course including **stationary and non-stationary forecasting models, asymptotic theory for time series, linear regression with time series data, Box-Jenkin's modelling strategy (ARIMA), Vector Autoregression (VAR), and error correction models**. The emphasis of this course is on understanding the econometric time-series methods and their application using real-world data and issues

LEARNING OBJECTIVES

After this course, students will be able to:

- Estimate and interpret univariate and multivariate time series econometric models (basic and more advanced models).
- Apply estimated time series models to areas of policy analysis and forecasting.
- Understand the role of predictive analytics in the context of several applications to business, finance and resource economics.
- Be proficient using R Studio and Stata for exploratory time series analysis; apply advanced time series econometric methods and estimation methods to empirical data.
- Be capable of critically evaluating published econometric research that uses advanced time-series econometrics methods

BIG QUESTIONS & REAL-WORLD APPLICATIONS IN CLIMATE, FOOD AND THE ENVIRONMENT

1. What are the short-term and long-term economic impacts of various policies? For example, carbon pricing.
2. How do macroeconomic variables influence commodity prices?
3. What is the best way to assess the forecast accuracy of your time series model?

FRE 529 (1.5) Estimating Econometric Models

Instructor: Dr. Mike Johnson

This course is designed to **introduce advanced econometric methods and related econometric theories useful for economists working in the food and resource sectors**. The course introduces students to the techniques of causal inference, which are illustrated and assessed through extensive exploration of the environmental economics literature. Topics include instrument variables (IV) estimation, experiments and quasi-experiments (difference-in-difference estimation) and panel data methods (basic models and dynamic panel models).

LEARNING OUTCOMES

- To learn various advanced econometric methods, estimation methods and related econometric theories. To apply advanced econometric modeling techniques using R to estimate models using real- world data and replicate results from published econometrics research.
- To critically evaluate published econometric research that uses advanced econometrics methods.
- To be able to formulate your own research question based on a given journal paper and data availability. To develop a small original research study that is an extension of a current research paper in the area of food and resource economics

BIG QUESTIONS & REAL-WORLD APPLICATIONS IN CLIMATE, FOOD AND THE ENVIRONMENT COVERED IN THE COURS

1. Instrumental variables, an econometric tool to understand the causal effects of natural experiments, is used to draw the causal links between increased forest fires and health, and the effects of income growth on deforestation. Both these papers are among the ones used in our final research/replication project.
2. Students gain valuable exposure to research that employs panel data methods to compare policies across different countries aimed at reducing carbon emissions.
3. Finally, difference-in-difference methods are used to exploit the causal effect of policy changes for specific policies

FRE 518 (1.5) Survey Design& Analysis

Instructor: Dr. Tim Silk

Focus groups and surveys are the two most common data collection methods used in industry. This course **will teach students industry best-practices for conducting applied market research using focus groups and surveys**. The course will give students hands-on experience with focus group and survey research so that they leave the course with the ability to design, implement and analyze data collected via focus groups and surveys. Topics include the market research process, defining research objectives, focus group design and implementation, survey design and implementation, sample selection, data analysis, and presenting research findings. Classes will be discussion-based, interactive, and will present real-world examples of how the various research methods are used in industry. This course will be of interest to anyone who wants the ability to collect original data and insights using focus groups and surveys

LEARNING OUTCOMES

1. Write a well-defined research question that acts as a guide in the market research process.
2. Identify and apply the appropriate data collection techniques to address the research question.
3. Design and implement effective exploratory interviews that identify new insights about the problem domain.
4. Design and implement effective surveys that provide confirmatory data about the problem domain.
5. Analyze focus group and survey data using a variety of qualitative and quantitative techniques including narrative theme coding, descriptive analysis, crosstab analysis, t-tests, chi-square analysis, and cluster analysis.
6. Present research findings in a captivating manner that clearly articulates key findings and insights.

BIG QUESTIONS & REAL-WORLD APPLICATIONS IN CLIMATE, FOOD AND THE ENVIRONMENT COVERED IN THE COURSE

How to identify and uncover real-world insights that any organization is struggling to understand. For example, how can we overcome barriers in getting people to reduce their carbon footprint? What are people's attitudes about our ability to positively impact climate change? This course will arm students with the methodological skill set to explore a problem domain, identify key themes, develop a survey to measure attitudes, and analyze the data to produce actionable recommendations

FRE 531 (1.5) Global Food and Resource Governance

Instructor: Dr. Matias Margulis

Students taking this course **will develop a better understanding of the role of governments, business, civil society and international institutions in global food and resource policy-making**. The course is organized around the examination of real-world controversies in global food and resource governance – such as, but not limited, to global food crises, large-scale land acquisitions, and the agriculture negotiations at the World Trade Organization. We will use these cases as the basis to explore how an issue or problem comes to be placed on the international policy agenda, which actors get to participate in the global policy-making process, and why global policy-making efforts succeed or fail. Students who complete this course will develop substantive knowledge of global policy-making around food and resources and be able to assess the efficacy, fairness and legitimacy of, and possible alternatives to, current global policies and governance arrangements

LEARNING OUTCOMES

- Demonstrate an advanced understanding of the role of global public, private and hybrid institutions active in regulating the food and resources sector;
- Identify and assess the preferences of different stakeholders and their capabilities to influence the global food and resources policy;
- Appraise the effectiveness and equity of global policies and regulations designed to respond food and resource problems;
- Analyze and integrate various forms of evidence and data to assess complex global food and resource problems and policies;
- Apply knowledge, skills and understanding in planning and executing research on contemporary problem in global food and resource governance

BIG QUESTIONS & REAL-WORLD APPLICATIONS IN CLIMATE, FOOD AND THE ENVIRONMENT COVERED IN THE COURSE

- Why is India banning the export of rice? Will this result in a global food crisis? Why are global food prices increasing?
- How is US-China economic rivalry affecting international trade in agriculture and food? What policies could support a transition to more sustainable food systems?
- How can investors ensure “win-win” agriculture investments in developing countries?

FRE 505 (1.5) Agricultural and Resource Policy Analysis - Policy and Project Evaluation.

Instructor: Dr. Rick Barichello

This course **introduces students to the use of two common evaluation tools for government policies and projects, the Policy Analysis Matrix (PAM) and Cost-Benefit Analysis (CBA)**. It also **introduces students more briefly to the use of Domestic Resource Cost (DRC) and its calculation**. The PAM and DRC are focused on policies and CBA on investment projects. Both involve distinguishing between private and social (or economic) profitability, and both involve data collection at the micro (farm or project) level. Substantial attention is given to understanding factor markets and related institutions to enable quality data collection. Case studies are used. In early lectures, the topic of agricultural productivity measurement is also introduced

LEARNING OUTCOMES

1. Master the concepts in the PAM, Total Factor Productivity and CBA.
2. Understand the type of data required for each.
3. Identify key elements of local factor markets in order to collect appropriate data.
4. Apply the PAM (Including DRC) and CBA in real life settings with actual data.
5. Handle common difficulties or barriers to obtaining high quality data, and develop ways to overcome them.
6. Identify measures of agricultural sector productivity, particularly Total Factor Productivity, and the steps and challenges in measuring the latter.

BIG QUESTIONS & REAL-WORLD APPLICATIONS

1. How can we evaluate government policies, such as within the food sector, to see if they increase national incomes, incomes of farmers, incomes of consumers, or incomes of other firms like processors, and reduce wasteful or inefficient outcomes?
2. How do these evaluation results change when we include externalities such as environmental damages or government policy/regulatory distortions?
3. How can we choose the investment projects from national government funds or foreign aid funds that maximize the increase to national incomes, and to the incomes of important sub-groups like farmers, poor families, and other groups that are otherwise disadvantaged (e.g., women, aboriginal populations) and also reduce corrupt and wasteful investment expenditures?
4. What evaluation procedures must be adopted to handle overall country-wide effects, as well as the distribution effects on various sub-groups, and the capacity to include externalities such as environmental damages or benefits, taxes, subsidies, and over- or under-valued exchange rates, all of which make this tool different from a financial investment appraisal?

FRE 521E (1.5) Supply Chains in Food and Agriculture: Economic Analysis and Technological Transformations.

Instructor: Dr. Murray Fulton

Over the last 40 years, agri-food supply chains have become increasingly complex and integrated. Traditional spot markets have been replaced with contractual relationships, supermarkets have emerged as key players in food retailing worldwide, food products have become more and more differentiated, the various stages of the supply chain have become increasingly concentrated and vertically integrated, and certain strategically important countries (e.g., China, Brazil, Ukraine) have become major buyers and sellers. Using a set of conceptual tools and empirical examples, this **course examines the economics of agri-food supply chains and the significant transformations they have undergone.**

LEARNING OUTCOMES

1. Understand the reasons for and estimate the extent of market power in agri-food supply chains;
2. Explain the pricing strategies used in agri-food supply chains;
3. Explain the increased vertical integration in agri-food supply chains and analyze its impact;
4. Explain the rise of private labels and standards in agri-food supply chains and analyze their impact; and
5. Describe and analyze the technological changes that have transformed and are transforming agri- food supply chains

BIG QUESTIONS & REAL-WORLD APPLICATIONS IN CLIMATE, FOOD AND THE ENVIRONMENT COVERED IN THE COURSE

1. Agri-food supply chains have changed dramatically over the last 40 years and can be expected to transform further in the foreseeable future. What are the changes that have occurred and why have they happened? What changes are likely to take place in the future?
2. Agri-food supply chains have become highly concentrated. What are the reasons for this increased concentration? What are the expected effects? How can the impact of this concentration on prices be measured empirically?
3. Vertical supply chains face a host of challenges, such as opportunistic behaviour by suppliers, the need to coordinate the behaviour of many buyers and sellers, and the increasingly diverse nature of consumer demand. How have agri-food firms responded to these challenges? What insights does this response provide for firms today?

FRE 585 (3) Quantitative Methods for Business and ResourceManagement.

Instructor: Dr. Mike Johnson

This course will **provide the necessary foundation and learning experience for students to apply a variety of modeling and analytic techniques to business and resource management problems**. This class will concentrate on frequently used quantitative and decision-making models that include decision analysis, resource allocation models, optimization such as linear programming (allocation and scheduling of resources), forecasting and predictive analytics, simulation modeling, sustainable operations, and supply chain management

LEARNING OUTCOMES

Decision Analytics: Build and evaluate decision models to determine using mathematical expectation, risk, opportunity loss and the value of perfect information. Apply sensitivity analysis, critical thinking and judgement in the context of data and analytic interpretations.

Predictive Analytics: Use predictive analytics and forecasting tools on data that exhibits stationary, trend and seasonal characteristics. Evaluate predictions using standard forecasting metrics and cross-validation techniques.
Prescriptive Analytics: Create conceptual formulations of linear optimization problems with continuous decision variables. Develop and solve optimization models using graphical methods and Excel's Solver add-in. Perform sensitivity analysis and make managerial interpretations after obtaining optimal solutions.

Model the traditional costs of managing inventory decisions under a variety of contexts (perishable food inventories) and its relationship with supply chain management.

Visual Analytics: Build explanatory visualizations to convey an effective data story. Verbally communicate findings within individual and team-based environments using storytelling techniques

REAL-WORLD APPLICATIONS IN CLIMATE, FOOD & ENVIRONMENT

- This course starts with an interactive simulation where you will learn about the elements driving climate change and work collectively in teams to understand its complexity and discuss solutions. Through the remainder of the course, we will investigate how data analytic methods (decision analytics, predictive analytics, or prescriptive analytics) can be used to understand the trade-off between economic and environmental decision-making.
- How can analytical models help with the planning of food production in order to reduce food waste? What is supply chain sustainability and its interrelationship with the total cost of ownership and risk management?

FRE 521F (1.5) ESG in Global Food Systems: Strategies, Challenges and Opportunities

Instructor: Sid Mehta

FRE 521F introduces the core principles of **Environmental, Social, and Governance (ESG**) and **their vital role in shaping sustainable business strategies across agriculture, food systems, and resource management sectors**. The course explores how global frameworks guide national policies and industry practices, helping businesses align operations with environmental regulations while pursuing long-term growth.

Designed with a focus on practical application, this course equips students with the **tools to develop ESG strategies applicable across a range of organizations—from food producers, retailers, and processors to supply chain managers**. Students will gain valuable skills for creating ESG plans that support sustainable practices, ensuring compliance with regulatory requirements, improving environmental and social outcomes, and driving business value.

Through real-world case studies, interactive activities, and guest lectures from industry experts, students will learn to navigate the challenges and opportunities of integrating ESG principles into business operations. By the end of the course, students will be prepared to apply ESG strategies in any organization working toward sustainability goals, making them well-suited for strategic roles across agribusiness, food systems, and resource management industries

LEARNING OUTCOMES

1. Understanding ESG Principles

- Explain the basic concepts of Environmental, Social, and Governance (ESG) and their importance in sustainable business practices.
- Identify key environmental, social, and governance responsibilities within food systems.
- Recognize differences in ESG practices between two specific countries or sectors.
- Use examples to understand how companies integrate ESG principles in agrifood operations.

2. Exploring Global Sustainability Frameworks

- Describe how global sustainability goals, such as the UN SDGs, influence government policies and business decisions in food systems.
- Understand how countries develop commitments for global frameworks like Paris agreement, Biodiversity desertification and how these shape agribusiness policies and practices.

3. Learning ESG Reporting Standards

- Explore the main ESG reporting frameworks, such as GRI, SASB, TCFD, and SBTi, and understand their role in the food sector.
- Identify the challenges and benefits of these frameworks and how companies use them to report on sustainability efforts.
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4. Recognizing Emerging ESG Trends

- Explore new trends in ESG, such as regenerative agriculture and the use of digital technologies in food production.
- Discuss how these trends impact business strategies and sustainability goals.

5. Developing Practical ESG Strategies

- ·Create a simple step-by-step plan to help a business integrate ESG into its operations.
- Learn how businesses can align their strategies with both government policies and global frameworks.

6. Engaging with Industry and Government Expert

- Participate in discussions with industry leaders and policymakers to gain insights into real-world ESG opportunities and challenges.