

**The Wharton School – University of Pennsylvania**  
**FNCE 311/811**  
**Infrastructure Financing and Investing**

**Fall 2019**  
**Preliminary Course Syllabus**

*(Please note that this syllabus is subject to change over the duration of the course; however, the general structure and content of the course will remain the same.)*

**Professor Kevin Kaiser**

**Teaching Assistants**

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tbd

**Classroom & Time**

FNCE 311 (Undergraduate) – M/W at 1:30 p.m. – 2:50 p.m. – JMHH F55  
FNCE 811 (MBA) – M/W at 3:00 p.m. – 4:20 p.m. – JMHH F55

**Course Description**

The world economy runs on the infrastructure which has been built over the past 10,000 years. Each year, this infrastructure requires updating and new additions, from roads and bridges (the original infrastructure), to railroads, airports (the more recent infrastructure), to telecommunications and solar and wind power installations (modern infrastructure). There is a vast amount of public (i.e., taxpayer money directed by government officials) and private (i.e., individuals' money typically managed on their behalf and directed by pension or private equity fund managers or banks into infrastructure investments). In this course, we will cover Infrastructure Financing and Investing from various angles. We will provide descriptions of types of infrastructure, examine the financing needs of infrastructure projects, consider the historic role of government and non-government funding, and assess the changing needs of consumers and role of technology and the increasing demands posed by a globalizing economy. As pension funds and private equity firms increasingly allocate investors' money to infrastructure funds, the need for, and role for, private money in funding infrastructure continues to evolve, so we will also examine infrastructure investing as an alternative asset class from the investors' perspective.

The upfront financing of new infrastructure projects often falls into a category of finance known as "Project Finance" when it involves private investors. Project Finance structures are typically very complex, and involve multiple parties, and are designed to involve these parties in order to align incentives and allocate risks to simultaneously ensure the financing of the project and maximize the likelihood of success of the project (for example, by involving government, banks, and business sponsors all in the financing). The structure is heavily oriented around the complex debt instruments and terms and much effort is focused on managing the risks and minimizing the downside for the debt providers.

The equity and ongoing financing of infrastructure investments are typically referred to as

Infrastructure Investing. This is considered to be an *alternative investment class*, sometimes considered to be a subset of Private Equity, in the taxonomy of asset management. This side of infrastructure investing need not occur only at project initiation. At any point during the life of a project, an investor may wish to acquire or dispose of an investment in the infrastructure asset.

As such we can think of Project Financing as the “Venture Capital” or “start-up” stage of Infrastructure Financing and Investing, and Infrastructure Investing as the “Private Equity” stage once the asset is up and running and is now being purchased or sold. In any case, the project management, investment terms, legal rights and obligations, and many other factors will be important to all parties and the terms of the investment will likely address these various angles. As a result, infrastructure investing requires considerable expertise and experience on the parts of the investors as well as the government and other stakeholders.

## Delivery of Content

In addition to Professor Kaiser, it is anticipated that various speakers from roles in Private Equity, Asset Management, advisors, and perhaps government or other parties involved in infrastructure investing, will deliver content in this course. While not guaranteed due to possible scheduling difficulties, speakers who have agreed to contribute to the course include:

	<u>Date of guest lecture</u>
 Vivien Foster, Chief Economist, Infrastructure Vice-Presidency, Infrastructure, World Bank	Mon., 09/23
 Louis Paul, MD, Macquarie Infrastructure and Real Assets	Wed., 09/25
 Lars Pace, Principal, Fund Investment Team, Hamilton Lane	Mon., 09/30
 Brent Tasugi, Principal, AMPCapital	Wed., 10/09
 Mark Jennings, SVP, Head of Project Finance, North America	Wed., 10/16
 Johan Pfeiffer, MD and Operating Partner, Morgan Stanley Infrastructure Partners	Wed., 10/23
 Shomik Mehndiratta, Practice Manager at South Asia Transport, World Bank	Mon., 10/28
 Christopher Mann, Partner, Sullivan & Cromwell, coordinates global infrastructure practice and its sovereign finance practice	Mon., 11/06
 Pablo Garcia Aguilar, Chief Financial Officer & Head-Investor Relations at Empresas ICA SAB de CV	Mon., 11/18

Topics to be covered are numerous, but focus on Valuing, Financing, Structuring and Investing in Infrastructure projects.

- We will consider the methods for assessing the value creation provided by the project itself, and then understand how to allocate that value to the financial providers to maximize the value and minimize the risk. Once up and running we will consider how to identify and value investment opportunities in the infrastructure arena.
- We will delve into the development and role of public-private partnerships (referred to as PPP, 3P or P3) structures.
- We will cover infrastructure investment from various angles including building new infrastructure (referred to as “greenfield” projects), redeveloping existing infrastructure assets (sometimes referred to as “asset recycling” and investing in existing infrastructure as a new acquirer (Infrastructure M&A or brownfield investments). The common thread in the course is the involvement of private money (non-government) investors.
- We will also discuss the development of alternative ‘models’ and ‘regimes’ for facilitating private investment in assets previously considered the domain of government funding and management, as well as the necessary policy changes to facilitate ongoing development of private sector involvement in infrastructure assets.
- We will cover different geographies. Much of the recent growth in infrastructure investing originated in Australia where municipalities were early to appreciate the value benefit of PPP arrangements for infrastructure assets and where there has been tremendous growth in the investment opportunities and skillset around infrastructure investing.
- In the Project Finance phase, it is essential to be able to understand the underlying drivers of cash generation and consumption and assess the value and debt capacity of the project to be financed. In this phase of the project, cash flow forecasting is absolutely essential, and this requires a deep understanding of the drivers of value in the project. These drivers need to be modelled in Excel and associated with all sources and uses of cash in order to obtain a forecast of project cash flows.
- Reviewing and revising the core principles of finance to enable an assessment of risk, required return and value. This will take us back to the core principles of finance and the foundational theories of non-diversifiable risk, and Modigliani-Miller capital structure relevance.
- The complications continue when these cash flows need to be allocated to the debt providers, which requires careful and complete understanding of the financing structure and the rights and priorities of the various financial providers. We will cover some of the debt structuring terms and assessment of debt capacity for these projects.
- We then consider Infrastructure Investing as an asset class and as an activity independent of getting an infrastructure project up and running.
- We will cover the role of infrastructure investing to improve portfolio diversification
- Infrastructure investments fall roughly into two categories – those with “utility-like” cash flows which are often sought out by institutional investors with long-term liabilities who wish to hold long-term assets with stable, long-term predictable income, and those more similar to industrial investments undertaken by PE firms where assessment of risks and the importance of operational improvement are key to realizing a good ‘alpha’ on the investment.
- There always exists the possibility of pricing deviating from value in illiquid investments, and large infrastructure investments may be ripe for such opportunities, providing

opportunities for portfolio outperformance. However, identifying such opportunities requires an understanding of both the pricing of these assets and, much more difficult, the valuation of these assets. We will devote lecture time to review the core valuation principles and tools, and these will be applied to value infrastructure investment opportunities in various cases in the course.

The structure of the course includes lectures, case discussions, and guest speakers.

1. Lectures delivered by Professor Kaiser, as well as delivered by industry practitioners, will focus on the underlying principles and concepts of finance in general as well as the principles of Infrastructure Valuation, Financing and Investing.
2. The case exercises are intended to provide participants an opportunity to work in teams and discuss, analyze, and propose their recommendations for resolving the case situation. Each group must submit a short (maximum one full page) executive summary of their reflections and commentary for each case. These are required for credit but will not be graded. In addition, each group must submit two “long” reports, maximum 3 pages plus exhibits, for two selected case assignments. Each group is expected to **hand in** a hard-copy of their reports **prior to any class discussion**. Supporting computations and tables can be included in an appendix and submitted in Excel format. All of the inputs and formulas used should be provided (preferably as a footnote). Some of the case assignments contain questions that need to be addressed, however you will also be graded based upon how well you identify the relevant questions and issues to be addressed. Therefore, whether there are questions for the case or not, please consider what the relevant questions are in the context of each case and discuss why and then perform the necessary analysis to address these questions.
3. The guest speakers will offer the personal perspectives of key players in the infrastructure investing arena. Practitioners will bring a variety of real world examples from their own experience, including investing in brownfield and greenfield opportunities, understanding the legal and banking perspectives and relating to the policy changes underway in the USA and elsewhere to facilitate increasing involvement of private sector money in infrastructure investing.

Grades will be based upon individual and team performance assessed as follows:

1. **CASE EXERCISES:** Long reports for 3 of the case exercises (35% of the final grade, submitted in individually and in teams). Short reports must be submitted for remaining cases (those for which your team isn't doing a long report).
2. **GROUP REFLECTION PAPER:** and a final “Topical/Reflection Paper” summarizing your team learning from the course and applying those learnings to a self-selected topical issue/event related to Infrastructure Valuation, Financing, and Investing to be presented to the class (35% of the final grade, submitted in teams).
3. **INDIVIDUAL REFLECTION PAPER:** an individual paper summarizing your personal insights and learnings gained during this course (10% of final grade).
4. **PARTICIPATION:** Quizzes and seminar participation (20% of the final grade)

Note: all written work must be submitted in PDF format and the filename must indicate the Team's

number and whether it is a Case, Topical Paper or Reflection Paper. For the Case Exercises, please ensure your submission also indicates (in the filename of the pdf document), whether it is the “long” report or the “short” report in addition to the name of the case.

## Sessions & Readings

Class #	Date	Topic	Case	Faculty	Presenters
1	Wednesday, August 28, 2019	Intro to the Infra Investing course		KK	
2	Wednesday, September 4, 2019	The world's infrastructure needs and challenges		KK	
3	Monday, September 9, 2019	Infrastructure as an asset class		KK	
4	Wednesday, September 11, 2019	Why Project Finance/Public Private Partnerships?		KK	
5	Monday, September 16, 2019	Value Investing Principles		KK	
6	Wednesday, September 18, 2019	Development of Infrastructure Investing	Macquarie case, Partne	KK	
7	Monday, September 23, 2019	World Bank approach to Infrastructure		KK	Vivien Foster - confirmed
8	Wednesday, September 25, 2019	Macquarie's historical development		KK	Louis Paul - confirmed
9	Monday, September 30, 2019	A view from the LP Perspective		KK	Lars Pace - confirmed
10	Wednesday, October 2, 2019	The PPP structure - nexus of contracts		KK	
11	Monday, October 7, 2019	Milan Metro Line 5	Milan Metro Line 5	KK	
12	Wednesday, October 9, 2019	The PPP structure - Risks		KK	Brent Tasugi, tentative for Oct. 9
13	Monday, October 14, 2019	The PPP structure - Risks and Challenges		KK	
14	Wednesday, October 16, 2019	Investing in Infrastructure in the USA		KK	Mark Jennings
15	Monday, October 21, 2019	Operational Value Add	Indiana Toll Road	KK	
16	Wednesday, October 23, 2019	Operational Improvement & Value C Development of the Investing arena		KK	Johan Pfeiffer
17	Monday, October 28, 2019	Investing in Emerging Markets - BTS Skytrain	BTS Skytrain Carveout	KK	Shomik Raj Mendiratta - in, not con
18	Wednesday, October 30, 2019	Investing in Emerging Markets - BTS Skytrain		KK	
19	Monday, November 4, 2019	Investing in Infrastructure in the USA		KK	
20	Wednesday, November 6, 2019	The PPP structure - key issues		KK	Chris Mann - Gateway Program
21	Monday, November 11, 2019	ESG considerations		KK	
22	Wednesday, November 13, 2019	Emerging Markets	Nigeria Toll Road????	KK	
23	Monday, November 18, 2019	Emerging Markets	Infrastructure in Mexico and South America	KK	Pablo Garcia Aguilar - confirmed
24	Wednesday, November 20, 2019	Thanksgiving - No class today	no class today	KK	
25	Monday, November 25, 2019	Presentations & Reflection		KK	Group presentations
	Wednesday, November 27, 2019	Thanksgiving - No class today	no class today	KK	
26	Monday, December 2, 2019	Presentations & Reflection		KK	Group presentations
27	Wednesday, December 4, 2019	Presentations & Reflection		KK	Group presentations
28	Monday, December 9, 2019	Presentations & Reflection		KK	Group presentations

## Additional Background Reading

Infrastructure as an Asset Class, by Barbara Weber, Mirjam Staub-Bisang, and Hans Wilhelm Alfen, 2016

Infrastructure Finance, by Martin Blaiklock

Project Finance in Theory and Practice, by Stefano Gatti

Public-Private Partnerships for Infrastructure, by E. R. Yescombe and Edward Farquharson