



Technology, Innovation and Entrepreneurship in the New Space Era (MGMT 897) Oct, 2021

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COURSE DESCRIPTION

Over the past five years, humanity has taken a massive leap into a new Space Era made possible by powerful enabling technologies and private sector entrepreneurs from around the world in collaboration with the public sector. What used to be the exclusive domain of two superpowers is now being democratized and made accessible to established organizations and entrepreneurs from both developed and emerging countries. The cost of escaping Earth's gravity is expected to fall by more than two orders of magnitude by innovations in reusable rockets and business models.

The objective of the course is to provide students with an extraordinary exposure to this exciting global business domain in the new space era and the opportunities for value creation it unfolds. Immersion into the new space age will provide students with several unique learning opportunities because:

- it departs from the traditional mindset of superpowers, arms race and nation defense
- it is a “green field” in terms of use cases and business models; Hence, it presents significant opportunities for creativity and experimentation
- it is a challenging technological domain with long periods of development and commercialization with high uncertainty in terms of which/whose technological solution will emerge as an eventual winner
- it also presents significant challenges in terms of financing of innovation because the costs and the returns are not a good fit with the traditional VC and internal or external capital markets models

The course will consist of a series of panel discussions and lectures focusing on the historical evolution of the space sector, global trends in technologies, markets and business models, strategies of emerging start-ups and established organizations, financing models and the role of the public sector in different global regions. The panels would involve prominent leaders and public officials involved within the new space age. The course will culminate with a team project in which students will have to ideate, design and share a pitch for a new business related to the opportunities the new space era will create on our planet and beyond. In so doing, the course would provide students with a rare stimulating intellectual journey to stretch their thinking and provide fresh perspectives that can be applied to any nascent industry context encompassing emerging technologies and business models.

Through this course, students would be exposed to the new space age as an emerging context with exciting possibilities for technological innovation and entrepreneurship at a global-level. It would also help broaden the horizon in terms of opportunities and challenges around technology commercialization and entrepreneurship in a complex technological and institutional landscape.

PREPARATION & GRADING

Students will be evaluated based on their active participation throughout the course in terms of attendance, and engagement. They would also be evaluated through a market analysis assignment and the final project presentation:

- Participation (50%)
- Individual Market Analysis Assignment (20%) due on Oct 17
- Team Project (30%)

PRELIMINARY COURSE SCHEDULE

Session 1, Oct 18 (4-7pm ET) - Introduction and Historical Perspective of the New Space Era

- Perspectives on Launch Vehicles, Telecom, Small Sat, Habitats

Session 2, Oct 19 (4-7pm ET) - Key Technology Trends and Market Opportunities

- Government, Commercial, Global

Session 3, Oct 20 (4-7pm ET) - Strategies of Space Start-ups and Incumbents

- Rocket Lab, Virgin Galactic, Blue Origin, Space X, Lockheed Martin, Boeing Horizon X

Session 4, Oct 21 (4-7pm ET) - Ecosystem Facilitation by Public Agencies

- NASA, ESA, JAXA, FAA

Session 5, Oct 22 (4-7pm ET) - Funding the New Space Era

- Perspectives from Bessemer Venture, Near Earth, SpaceFund, Space SPACs

SUGGESTED READINGS

- Adner, Ron and Kapoor, Rahul (2016), "Right Tech, Wrong Time: How to Make Sure that Your Ecosystem is Ready for the Newest Technologies," Harvard Business Review, 94(11): 60-67.
- Adner, Ron. "Match your innovation strategy to your innovation ecosystem." Harvard Business Review, April 2006.
- Bryce Space and Technology. 2020. "Start-Up Space: Update on Investment in Commercial Space Ventures."
- Christensen, Clayton M. "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail." Harvard Business School Press, 1997.
- Furr, Nathan and Kapoor, Rahul "Capabilities, Technologies, and Firm Survival during Industry Shakeout: Evidence from the Global Solar Photovoltaic Industry." Strategic Management Journal. 2017.
- Davidian, K. (2021). What makes space activities commercial?. Acta Astronautica, 182, 547-558.
- Davidian, K. (2020). Space tourism industry emergence: Description and data. New Space, 8(2), 87-102.
- Goldman Sachs (2020). "Space: The Next Investment Frontier."
- Kapoor, Rahul and Furr, Nathan and (2015), "Complementarities and Competition: Unpacking the Drivers of Entrants' Technology Choices in the Solar Photovoltaic Industry," Strategic Management Journal, 36(3): 416-436.
- Kapoor, Rahul and Klueter, Thomas (2020), "Progress and Setbacks: The Two Faces of Technology Emergence," Research Policy, 49(1): 103874.
- Kapoor, Rahul and Klueter, Thomas (2020), "Unbundling and Managing Uncertainty Surrounding Emerging Technologies," Strategy Science, 6(1), 62-74.
- Kapoor, Rahul and Klueter, Thomas. "Innovation's Uncertainty Factor", MIT Sloan Management Review, Fall 2020.
- Menon, Anoop and Huang, Laura. The Final Frontier: How Entrepreneurs Cracked the Aerospace Industry. (<https://knowledge.wharton.upenn.edu/article/how-entrepreneurs-cracked-the-aerospace-industry/>)
- Kapoor, R. (2018). "Ecosystems: Broadening the Locus of Value Creation." Journal of Org. Design.
- Teece, David. "Profiting from technological innovation: Implications for integration, licensing and public policy" Research Policy, December 1986.
- Weinzierl, Matthew C., and Alissa Haddaji. "Space Angels, Multiple Equilibria, and Financing the Space Economy." Harvard Business School Case 719-070, March 2019. (Revised May 2019.)
- Weinzierl, Matthew C., Kylie Lucas, and Mehak Sarang. "SpaceX, Economies of Scale, and a Revolution in Space Access." Harvard Business School Case 720-027, April 2020. (Revised June 2020.)
- Weinzierl, Matthew. 2018. "Space, the Final Economic Frontier." Journal of Economic Perspectives, 32 (2): 173-92.