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Innovation and Technology Management (MGT-819)

National University of Sciences & Technology (NUST)

Course Details:

Course Title: Innovation and Technology Management **Credit Hours:** 3

Course Code: MGT-819 **Pre-requisite:** N/A

Program: EMBA **Sections:**

Course Description:

The Innovation and Technology Management course will offer a comprehensive understanding of the principles, strategies, and practices required for effectively managing innovation and technology in modern organizations. This module is designed to equip students with the knowledge and skills necessary to navigate the rapidly evolving landscape of technology-driven innovation and capitalize on emerging opportunities. The student will also examine the challenges associated with managing innovation, such as intellectual property protection, capability and resource allocation.

The students will understand the stages of the innovation process, from idea generation to commercialization, why firm innovates, and how to manage innovation and R&D. It helps to examine methods for managing and fostering creativity within teams and organizations. The concepts of technology entrepreneurship will also be discussed to inculcate the spirit of entrepreneurship.

This course will also provide an understanding of intellectual property rights, patents, copyrights, and trademarks. The students will learn how to protect intellectual property assets and navigate legal issues related to innovation. The students will get an opportunity to explore real-world examples of successful and failed innovation and technology management, drawing from diverse industries and sectors with the help of case studies and group discussion.

Course Learning Outcomes:

1. **CLO 1. Understand** the importance of innovation and technology management for corporates and societies.
2. **CLO 2. Evaluate** the industry dynamics to become design dominant and to increase the firm value.
3. **CLO 3. Analyze** a firm position to craft a technology strategy for protecting and diffusing technological innovation.
4. **CLO 4. Prepare** oral presentations to effectively communicate knowledge of the field.
5. **CLO 5. Design** written reports which effectively communicate ideas and logic in a structured manner.

Program Goals & Learning Objectives:

Goals & learning objectives of the EMBA Program are:

Goal 1: Students will be capable of critical thinking

LO 1.1: Students will be able to solve problems with the application of business knowledge.

LO 1.2: Students will be able to evaluate competing decision criteria and alternatives

Goal 2: Students will demonstrate leadership skills

LO 2.1: Students will be able to develop the ability to lead and manage in teams

LO 2.2: Students will be able to make sound decisions

Goal 3: Students will learn to communicate effectively

LO 3.1: Students will be able to communicate effectively in oral presentations

LO 3.2: Student will be able to create professional reports

Goal 4: Students will deal with the ethical dilemmas that arise in a business environment

LO 4.1: Students will be able to identify ethical concerns emanating from a business situation

LO 4.2: Students will be able to apply ethical guidelines to address business problems by examining a set of alternatives

Mapping - CLOs with LOs

Learning Objective	LO 1.1	LO 1.2	LO 2.1	LO 2.2	LO 3.1	LO 3.2	LO 4.1	LO 4.2	Not mapped	Evaluation Item
CLO 1	✓									Exam Question
CLO 2		✓								Quiz
CLO3		✓								Case Study
CLO 4					✓					Project Presentations
CLO 5						●				Project Report

Note: ✓ indicates mapped and assessed CLO, ● indicates mapped but not assessed CLO and X indicates unmapped

Required Course Material:

- **Textbook:**
    - Shane, S. 2009. *The Handbook of Technology and Innovation Management*. Wiley Blackwell.
- **Reference Books:**
    - Narayanan, V. 2001. *Managing Technology and Innovation for Competitive Advantage*. Pearson Education Inc
    - Schilling, M. 2020. *Strategic Management of Technological Innovation.* McGraw-Hill Inc. (6th Edition); 4th and 5th Edition can also be consulted in case of unavailability of 6th Edition
    - Shane, S. 2013. *Technology Strategy for Managers and Entrepreneurs*. Pearson Education Inc

The list of Relevant Journals for the Course:

- R&D Management
  Economics of Innovation and New Technology
  Financial Times (Technology Section)
  Technological Forecasting and Social Change
  Harvard Business Review
  International Journal of Operations & Production Management
  International Journal of Technology Management
  Journal of Product Innovation Management
  Long Range Planning
  Research Policy
  Science, Technology and Human Values
  Technology Analysis and Strategic Management
  Technovation
  Industry and Innovation

Course Evaluation:

Grading will be done as per NBS criteria. The breakup is as follows:

End Semester Exam	30%
In-class experiential activities	30%
Innovative Technology Entrepreneurship Project	15%
Project Presentations	10%
Quizzes	10%
Class participation	5 %

(The class participation will include general in class discussion, participation in the case studies and class activities).

Weekly Schedule:

Week	Lecture No. and Topic	Preparation Material	Session Outcomes
1	**LECTURE 1** Introduction to innovation and technology management - Key Concepts	CH 1 Shane (2013) CH 1 Schilling (2020)	CLO 1
2	**LECTURE 2** **Technological evolution and technology life cycle.** Types of technological innovation Evolutionary patterns of technology development	**Required reading for class discussion:** CH 1 Shane 2009, Disruptive technologies: Catching the wave (HBR), skip. Is Tesla Really Disruptive? (HBS Article) **Read:** **Case Study: Tata Nano**	CLO 1

	Managing creative destruction, disruptive technology.		
3	**LECTURE 3** **Technology adoption and diffusion** Typical technology diffusion pattern, S-curves in technology diffusion, intended adopters, typical diffusion pattern	**Read:** CH 3 in Schilling /CH 2 in Shane Telenor Easy Paisa Technology Advancement in Music Industry	CLO 1 & CLO 2
4	**Rocket Pitch PROJECT Presentations, CLO 4**		
5	**LECTURE 4** **Technological opportunities and innovation** Source of technological innovation and opportunities Process of Innovation **Case Study:** Structo: A Start-Up in 3D Printing for the Dental Industry	**Read:** CH 2 in Schilling/ CH 4 in Shane Innovating on a shoestring What's the Big Idea (A) HBS **Quiz 1**	CLO1 & CLO2
6	**LECTURE 5** **Technical Standards and Design Dominance** Issues in Technical standard/ Design Dominance Standard battles and Design Dominance	**Readings:** Short case study: Standards Battles and Design Dominance. **Read**: CH 9 Shane 2009, CH 12 in Shane 2013 Case Study: The Rise of Microsoft TESLA Open Innovation Design	CLO 2 & CLO3
7	**LECTURE 6** **Customer Need Analysis for Technological Innovation** Market Pull Vs Technological Push Understanding and Identifying Customer Needs Market Research Strategies for Digital Startups	**Read:** CH 3 Shane 2009, CH 6 Shane 2013 **Quiz 2** **Class Activity**	CLO3
8	**LECTURE 7** **Modular vs Architectural Product** Concurrent Product Development	**Read:** CH 11 Schilling/ CH 7 Shane The Development of Zantac – Case Study	CLO3
9	**Proof of Concept PROJECT Presentations, CLO 4**		
10	**LECTURE 9** **Protecting Technological Innovation**	Protecting Innovation: The Digital Music Distribution Revolution	

	Types of Intellectual Property and preconditions Protecting Intellectual Property in world and Pakistan	Read: Intellectual Property: partnering for profit (McKinsey Quarterly) **Read:** Ch. 9 Schilling/ CH 8, 9 & 10 in Shane 2013, CH 10 Shane 2009	
11	**LECTURE 10** Randy Hetrick and TRX: Protecting Intellectual Property Rights (A and B) (HBS Case).		CLO 1-3
12	**LECTURE 11** **Competitive advantage in high-tech industries.** **Formulating Technological and Innovation Strategy** Capturing Value from Innovation Core Technological Capabilities Core Rigidities Effect on Competitive Advantage	**Read:** CH 6 Schilling / CH 10 and 11 Shane Digitalization and KODAK core rigidities	CLO2
13	**LECTURE 12** **Formulating technological innovation strategy:** Collaboration strategy**.**	**Read:** CH 13 Schilling/ CH 14 in Shane Dyesol: Partnering to Harness the Power of Sun (Case Study)	CLO2
14	**LECTURE 13** **Organization Structure for Technology Strategy** **Technology Entrepreneurship**	CH 10 Schilling How to kill creativity (Harvard Business Review)? Case Study: Google organizing for innovation **Read:** CH 15 & 16 in Shane **Quiz 3**	CLO3
15	**LECTURE 14** **Case study: Google Car**		CLO3
16	**LECTURE 15** Business Model and Business Plan Project Final Presentations		CLO 4
17		**BUFFER WEEK**	
18	**END SEMESTER EXAM WEEK**		