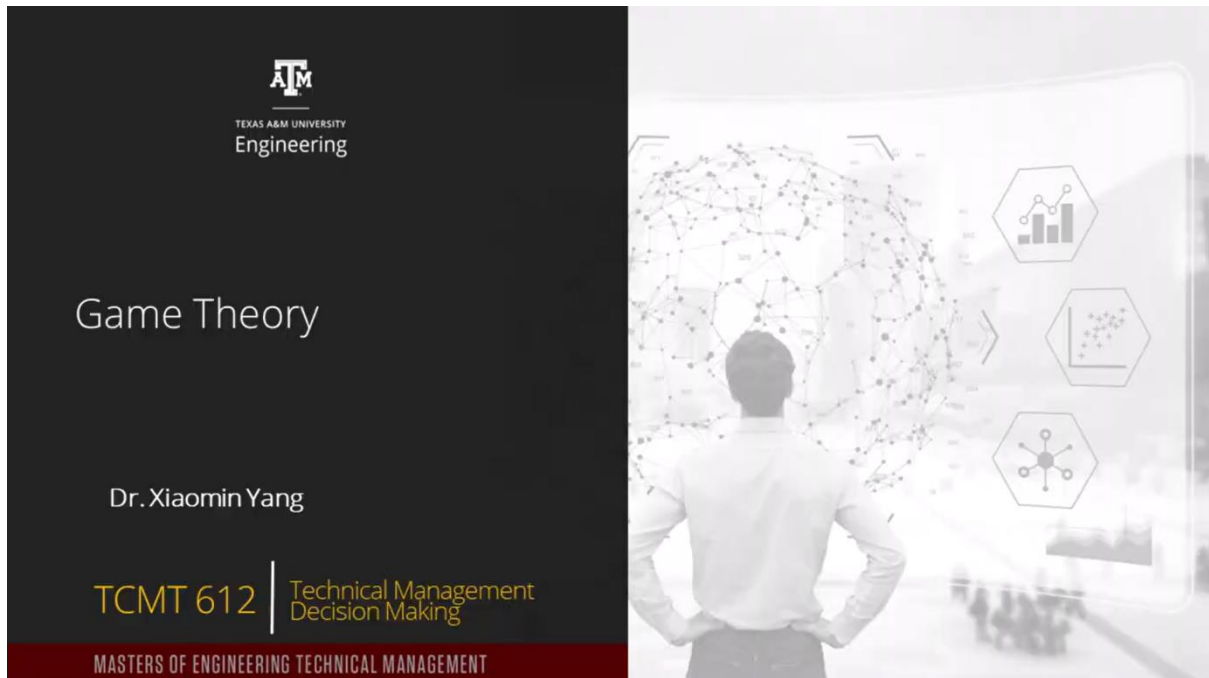


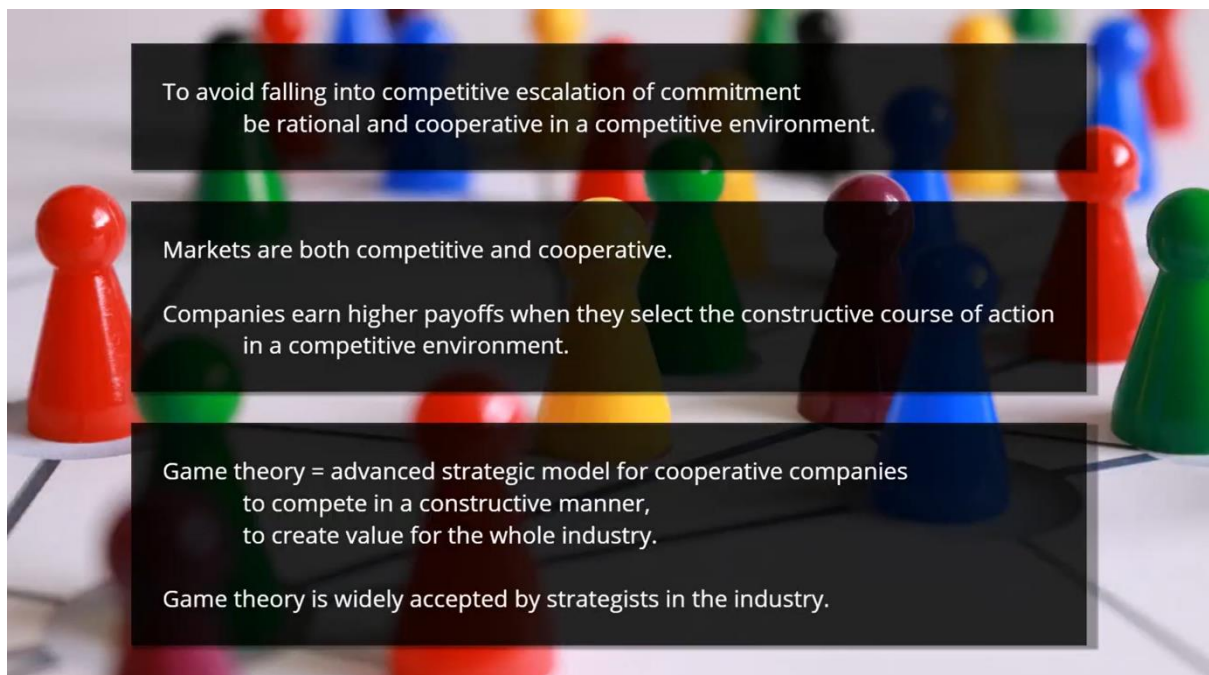
# M3L4. Game Theory

## Slide #1

The slide is split into two main sections. The left section has a dark background with the Texas A&M University Engineering logo at the top. Below the logo, the title 'Game Theory' is written in a large, white, sans-serif font. Underneath the title, the name 'Dr. Xiaomin Yang' is displayed. At the bottom of this section, 'TCMT 612' is written in a bold, yellow font, followed by 'Technical Management Decision Making' in a smaller, white font. A red banner at the very bottom contains the text 'MASTERS OF ENGINEERING TECHNICAL MANAGEMENT' in white. The right section of the slide features a grayscale image of a person standing with their back to the camera, looking at a large, glowing digital screen. The screen displays a complex network of nodes and lines, along with several hexagonal icons containing various data visualizations like bar charts and line graphs.

In this topic, we will describe game theory and how to avoid excessive competition.

## Slide #2

The slide features a background image of a chessboard with several colorful chess pieces (red, blue, green, yellow) positioned on it. Overlaid on this background are three dark gray rectangular boxes, each containing white text. The first box at the top states: 'To avoid falling into competitive escalation of commitment be rational and cooperative in a competitive environment.' The middle box contains two lines of text: 'Markets are both competitive and cooperative.' followed by 'Companies earn higher payoffs when they select the constructive course of action in a competitive environment.' The bottom box contains two lines of text: 'Game theory = advanced strategic model for cooperative companies to compete in a constructive manner, to create value for the whole industry.' followed by 'Game theory is widely accepted by strategists in the industry.'

One way to avoid falling into the competitive escalation of commitment is to be rational and cooperative in a competitive environment.

Markets are both competitive and cooperative. Companies earn higher payoffs when they select the constructive course of action in a competitive environment.

Game theory is an advanced strategic model for cooperative companies to compete in a constructive manner to create value for a whole industry for all the players that participate in the competition.

Game theory is widely accepted by the strategists in the industry.

### ***Slide #3***



Two technology giants who are deciding between introducing:

- (1) radically new alloy material for oil wells  
earn them hundreds of millions of dollars in profit;
- (2) improved version of older technology  
earn them much less.

Here is an example.

Consider two technology giants who are deciding between introducing a radical new alloy material for oil wells that could earn them hundreds of millions of dollars in profit or introducing an improved version of an older technology that would earn them much less.

**Slide #4**

<b>Cooperative strategy</b>		<b>Company A</b>	
		<b>New technology</b>	<b>Old technology</b>
<b>Company B</b>	<b>New technology</b>	<b>A earns \$600m B earns \$600m</b>	<b>A earns \$0m B earns \$150m</b>
	<b>Old technology</b>	<b>A earns \$150m B earns \$0m</b>	<b>A earns \$300m B earns \$300m</b>

If both companies decide to introduce the new technology, the market will accept the technology better.

And they would each earn 600 million dollars. But if only one company wants to introduce the new technology to the market, the market adoption will be worse.

And also the company needs to absorb all development costs of the new technology.

So the company who introduced the technology would only earn 150 million dollars.

The other company who does not want to introduce the technology, would lose market share and earn nothing.

Another scenario is both companies decide not to introduce new technologies.

They will continue splitting the existing market and each earn 300 million dollars from the existing market.

**Slide #5**



Application of Game Theory in the oil industry

Technology and engineering consortium  
that major oil firms sponsor.

Develop new technologies,  
share risk,  
grow new market out of the new technologies.

At the same time,  
each company develops its own version  
of the product of the technology,  
gains competitive advantage  
to split the market that they create together.

Another application of game theory in the oil industry is the technology and engineering consortium that major oil firms sponsor.

The consortium develops new technologies, share risk, and grow new market out of the new technologies.

At the same time, each company develops its own version of product of the technology and gain competitive advantage over each other to split the market that they created together.