Content Summary: Classical Game Theory

(March – May 2021)

There are a number of things I hope you have learned during this course. In general, I hope you have got an idea of (*i*) which types of games exist, (*ii*) how to solve them, and (*iii*) what their applications are. More specifically, I hope the course allows you to informally talk about the following topics ($\star$ basic, $\dagger$ advanced)

Section 0 – Introduction

$\star$ What is game theory about? (**Remark 1.1**)

$\star$ What are the elements of a game (what do you need to specify when defining a game)? (**Remark 1.2**)

$\star$ What is a strategy? What is the difference between an action and a strategy? (**Remark 1.5**)

Section 1 – Static games with complete information

$\star$ What is a static game with complete information (= normal-form game, one-shot game)? (**Definition 2.1**)

$\star$ What is a pure strategy, what is a mixed strategy? (**Definition 2.4**)

$\star$ When is a strategy dominated? (**Example 2.10, Definition 2.11, Remark 2.12**)

$\dagger$ What is (the idea behind) iterated elimination of dominated strategies? (**Example 2.13, Definition 2.14, Examples 2.15-16**)

$\star$ What is (the idea behind) a Nash equilibrium? (**Example 2.19, Definition 2.20**)

$\star$ What is the relationship between Nash equilibrium and iterated elimination of dominated strategies? (**Remark 2.22**)

$\dagger$ How can one compute Nash equilibria for simple (matrix) games? (**Remark 2.26, Example 2.27, Remark 2.28**)

Section 2 – Dynamic games with complete information

$\star$ What is a sequential game (= game of perfect information)? (**Example 3.1, Definition 3.2**)

$\star$ How does one interpret game trees? (**Remark 3.3**)

$\star$ What is (the idea behind) backward induction, and how to apply it to simple games. (**Example 3.4, Proposition 3.5, Example 3.6**)

$\dagger$ What is the backward induction paradox? (**Remark 3.7**)

$\dagger$ What are multi-stage games with observed actions? (**Example 3.9, Remark 3.10, Example 3.11**)

$\star$ What is (the idea behind) subgame perfection? (**Example 3.12, Definition 3.13**)

$\star$ What is the relationship between subgame perfect equilibrium & Nash equilibrium, and between subgame perfect equilibrium & backward induction? (**Remark 3.14**)

⋆ What is a repeated game? (**Remark 3.16**)

† How to prove subgame perfection for (infinitely) repeated games (one-step deviation principle) (**Remark 3.18, Examples 3.19**)

† What is the Folk theorem of repeated games about? (**Remark 3.20, Definition 3.21, Theorem 3.23, Remark 3.24**)

Section 3 – Games with incomplete information

⋆ How do models of static games with incomplete information look like? (**Example 4.2, Remark 4.3**)

† What is (the idea behind) Bayesian Nash equilibrium? (**Definition 4.4**)

⋆ What is a signalling game, and how to interpret game trees with incomplete information. (**Example 4.8, Definition 4.9**)

† What is (the idea behind) a Perfect Bayesian Nash equilibrium? (**Definition 4.10**)

⋆ What is a separating equilibrium / pooling equilibrium? (**Definition 4.12**)

General topics with no objective answer

⋆ What is your opinion of game theory as a science? What do you make out of its assumptions?

⋆ Give a 2-minute sales pitch why classical game theory is great.

⋆ Give a 2-minute sales pitch why classical game theory is flawed.

⋆ Which idea in game theory did you find most interesting / surprising / insightful?

⋆ What do you think: if the tape of game theory was replayed, would we arrive at the same concepts? That is, which concepts are most natural / self-evident to you? Which of them look artificial?