



ECO 355/AMS 335

Game Theory

Summer Session II: July 6 – August 15, 2020.

Online

## Instructor

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Course website: <https://blackboard.stonybrook.edu/>

Office Hours via *zoom*: Tuesdays 9:30am to 10:30am,  
Thursdays 8:00pm to 9:00pm,  
and by appointment.

## COURSE SYLLABUS

### Course Description

We call *games* to situations of strategic interaction, or in other words, to circumstances in which decisions taken by an individual affect other individuals' well being. *Game theory* is a formal way of thinking about these situations (or games). Most of your interaction with others in your everyday life can be thought of as a game, and game theory will give you an additional perspective about it. Game theoretic models have been widely applied to the study of behavior in a variety of disciplines including economics, business, psychology, political science, linguistics, and biology among others. This course has two objectives: the first one is to introduce you to the basic tools needed to formally analyze strategic interaction. You will learn a methodology that will help you understand simultaneous and sequential games with perfect and imperfect information. The second goal is to discuss economic applications of the theory. In particular, we will cover problems related to bidding behavior, market competition, bargaining, contracting, and voting. We will also pay attention to the growing literature on experimental games.

No mathematical knowledge beyond what is typically taught in high school is required. However, some willingness towards abstract thinking is essential for this class. At the beginning of the course I will provide you with an overview of the mathematical skills you will need throughout the course. It is great having you on board!

Click [here](#) for general tips and advice on taking summer classes.

## Course Objectives

After you complete this class you will be able to:

1. Identify situations of strategic interaction and construct a game theory representation of the situation.
2. Differentiate among alternative solution concepts, select the solution concept that applies to the problem at hand, and apply an appropriate technique or algorithm to find it.
3. Apply game theory to make predictions about individual behavior in auctions, bargaining, market competition, and political competition.

## Recommended Textbooks

*Strategies and Games: Theory and Practice* by Prajit K. Dutta, MIT press, 1999, 1<sup>st</sup> Edition, ISBN: 9780262041690.

*Game Theory: A very short introduction* by Ken Binmore, Oxford University press, 2008, 1<sup>st</sup> Edition, ISBN: 9780199218462.

*Strategy: An Introduction to Game Theory* by Joel Watson, W. W. Norton & Company, 2013, 3<sup>rd</sup> Edition, ISBN: 9780393918380.

Additional readings will be suggested in the website.

## Statement about Course Delivery/Modality

This is an asynchronous, online course, delivered in the Blackboard learning management system (LMS). Students must be mindful of all course expectations, deliverables, and due dates. All assignments and course interactions will utilize internet technologies. See “Technical Requirements” section for more information.

Here is a quick readiness quiz you can take to determine if you are ready for online courses <http://commons.suny.edu/assessment/quick-readiness-quiz/>

## Preferred Method of Contact with the Instructor

My preferred method of contact is via email. Please be sure to include your full name and “GT summer 2020” in the subject line when you send me an email. I strive to respond to your emails as soon as possible, but please allow me between 24-48 hours for a response. Please utilize your Stony Brook University email when getting in touch with me as that it is the preferred method of contact from the institution.

## Course Materials

The course is divided into 6 modules. Every week a new module will be uploaded to the website. In addition to the recommended readings, course materials include:

1. *Clips*: Short clips will be used to illustrate concepts or motivate discussions.
2. *Slides*: Slides to accompany the clips will be posted.
3. *Homework Assignments*: I will post weekly graded homework assignments. These assignments are intended for you to test your understanding of the topics discussed in clips or suggested readings. They are also useful to prepare you for exams.
4. *Guided Exercises*: I will provide you with sample exercises and guided answers, usually included within the class clips, to help you understand the reasoning and mechanics of the solution methods.
5. *Graded Quizzes*: There will be weekly graded quizzes. You may work through these quizzes offline but you will need to enter your answers online using blackboard.
6. *Exams*: Two graded exams will help you distinguish the material you have mastered from the material you need to continue studying. Both exams are online, the first one in on Monday, July 20<sup>th</sup> and the second one on Monday, August 14<sup>th</sup> both between 8:30am and 11:30am on blackboard.

## Grading Policy

Your grade in this class will be based on your performance in 6 homework assignments, 6 quizzes, and two exams. Assignments will account for 35% of your grade, quizzes will account for 35% of your grade, and each exam will account for 15% of your grade.

**Assignments (35%)**: You will have 6 graded homework assignments. These assignments will become available with your weekly materials at 8:30am ET every Monday, and will be due on or before 11:30pm every Sunday (except assignments 2 & 6, *see important dates below*). You can work on these assignments offline. You can type your answers and submit your file through blackboard, or you can handwrite your answers, take pictures, convert them into a single file (PDF format), and submit them through blackboard. Please, familiarize yourself with due dates by checking the section on “important dates” below.

To compute your course grade, I will **ONLY** consider your best 5 assignment scores. Hence, your lowest assignment score will **NOT** count towards your course grade.

**Quizzes (35%):** You will have 6 graded quizzes at the end of each module. You can think of these quizzes as weekly tests. Quizzes will become available at 8:30am ET every Friday and will be due on or before 11:30pm ET the same day (except quiz 6, *see important dates below*). You can take each quiz at most twice. Your score for the quiz will be the highest of your attempts. Please, familiarize yourself with due dates by checking the section on “important dates” below.

To compute your course grade, I will **ONLY** consider your best 5 quizzes scores. Hence, your lowest quiz score will **NOT** count towards your course grade.

**Exams (30%):** You will have two exams, and each of them will account for 15% of your grade. Exam I will cover modules 1 and 2. It will start at 8:30am ET on Monday, July 20<sup>th</sup> and it will be due on or before 11:30am the same day. Exam II will cover modules 3 to 6. It will start at 8:30am ET on Friday, August 14<sup>th</sup> and it will be due on or before 11:30am the same day.

If you miss an exam deadline, you will **NOT** be able to submit your test. Please, familiarize yourself with due dates by checking the section on “important dates” below. Also note that, unlike with quizzes, you can submit exams **ONLY ONCE**.

Specific instructions regarding the exam will be given before each test.

### Letter Grade Distribution

|               |    |               |    |
|---------------|----|---------------|----|
| $\geq 93.00$  | A  | 73.00 - 76.99 | C  |
| 90.00 - 92.99 | A- | 70.00 - 72.99 | C- |
| 87.00 - 89.99 | B+ | 67.00 - 69.99 | D+ |
| 83.00 - 86.99 | B  | 60.00 - 66.99 | D  |
| 80.00 - 82.99 | B- | $\leq 59.99$  | F  |
| 77.00 - 79.99 | C+ |               |    |

**Important Dates:** all times are in Eastern Time (ET)

|  |  |
|--|--|
| Monday, July 6 <sup>th</sup> , 8:30am.           | Module 1 becomes available.                |
| Friday, July 10 <sup>th</sup> , 8:30am.          | Quiz 1 becomes available.                  |
| Friday, July 10 <sup>th</sup> , 11:30pm.         | Quiz 1 is due.                             |
| Sunday, July 12 <sup>th</sup> , 11:30pm.         | Assignment 1 is due.                       |
| Monday, July 13 <sup>th</sup> , 8:30am.          | Module 2 becomes available.                |
| Friday, July 17 <sup>th</sup> , 8:30am.          | Quiz 2 becomes available.                  |
| Friday, July 17 <sup>th</sup> , 11:30pm.         | Quiz 2 is due.                             |
| Friday, July 17 <sup>th</sup> , 11:30pm.         | Assignment 2 is due.                       |
| Monday, July 20 <sup>th</sup> , 8:30am–11:30am   | Exam 1 takes place on blackboard and zoom. |
| Monday, July 20 <sup>rd</sup> , 8:30am.          | Module 3 becomes available.                |
| Friday, July 24 <sup>th</sup> , 8:30am.          | Quiz 3 becomes available.                  |
| Friday, July 24 <sup>th</sup> , 11:30pm.         | Quiz 3 is due.                             |
| Sunday, July 26 <sup>th</sup> , 11:30pm.         | Assignment 3 is due.                       |
| Monday, July 27 <sup>rd</sup> , 8:30am.          | Module 4 becomes available.                |
| Friday, July 31 <sup>st</sup> , 8:30am.          | Quiz 4 becomes available.                  |
| Friday, July 31 <sup>st</sup> , 11:30pm.         | Quiz 4 is due.                             |
| Sunday, August 2 <sup>nd</sup> , 11:30pm.        | Assignment 4 is due.                       |
| Monday, August 3 <sup>rd</sup> , 8:30am.         | Module 5 becomes available.                |
| Friday, August 7 <sup>th</sup> , 8:30am.         | Quiz 5 becomes available.                  |
| Friday, August 7 <sup>th</sup> , 11:30pm.        | Quiz 5 is due.                             |
| Sunday, August 9 <sup>th</sup> , 11:30pm.        | Assignment 5 is due.                       |
| Monday, August 10 <sup>th</sup> , 8:30am.        | Module 6 becomes available.                |
| Wednesday, August 12 <sup>th</sup> , 8:30am.     | Quiz 6 becomes available.                  |
| Wednesday, August 12 <sup>th</sup> , 11:30pm.    | Quiz 6 is due.                             |
| Wednesday, August 12 <sup>th</sup> , 11:30pm.    | Assignment 6 is due.                       |
| Friday, August 14 <sup>th</sup> , 8:30am–11:30am | Exam 2 takes place blackboard and zoom.    |

**Course Outline:** The course is divided into 6 modules. Each week a new module will become available and an assignment and a quiz testing your learning are due.

| Week     | Content   |
|----------|---|
| Module 1 | <p style="text-align: center;">The Language of Game Theory I: Building Blocks</p> <ul style="list-style-type: none"> <li>• Players and Strategic Interaction.</li> <li>• Actions and Strategies.</li> <li>• Rationality and Common Knowledge.</li> <li>• Preferences and Payoffs.</li> <li>• Sequential and Simultaneous Moves.</li> <li>• Single and Repeated Interaction.</li> <li>• Strategic and Extensive Representation.</li> </ul> |
| Module 2 | <p style="text-align: center;">The Language of Game Theory II: Rational Behavior</p> <ul style="list-style-type: none"> <li>• Dominant and Dominated Strategies.</li> <li>• Iterative Elimination of Dominated Strategies.</li> <li>• Best Responses.</li> <li>• Rationalization.</li> <li>• Nash Equilibrium.</li> </ul>   |
| Module 3 | <p style="text-align: center;">Static Games of Complete Information</p> <ul style="list-style-type: none"> <li>• Strategic Representation Revisited</li> <li>• Nash Equilibrium Revisited.</li> <li>• Pure and Mixed Strategy Equilibria.</li> <li>• Existence of Nash Equilibrium.</li> <li>• Applications.</li> </ul>   |
| Module 4 | <p style="text-align: center;">Dynamic Games of Complete Information</p> <ul style="list-style-type: none"> <li>• Extensive Form Revisited.</li> <li>• Perfect Information and Backward Induction.</li> <li>• Imperfect Information and Subgames.</li> <li>• Subgame Perfect Nash Equilibrium.</li> <li>• Repeated Games.</li> <li>• Applications.</li> </ul>   |
| Module 5 | <p style="text-align: center;">Repeated Games</p> <ul style="list-style-type: none"> <li>• Finitely Repeated Games.</li> <li>• Subgame Perfect Nash Equilibrium Revisited.</li> <li>• Infinitely Repeated Games.</li> <li>• Trigger Strategies and Folk Theorems.</li> <li>• Applications.</li> </ul>   |
| Module 6 | <p style="text-align: center;">Games of Incomplete Information</p> <ul style="list-style-type: none"> <li>• Static Games of Incomplete Information.</li> <li>• Bayesian Nash Equilibrium.</li> <li>• Dynamic Games of Incomplete Information</li> <li>• Information Sets, Knowledge, Beliefs, and Consistency of Beliefs.</li> <li>• Perfect Bayesian Nash Equilibrium.</li> <li>• Applications.</li> </ul>                               |

**Technical Requirements:** For this course you must have access to the Internet and an active Stony Brook University e-mail account. You are responsible for having a reliable computer and internet connection throughout the course. You will need to have access to, and be able to use, the following software

- A web browser (for instance, Google Chrome, Mozilla Firefox, Internet Explorer, or Safari).
- A .pdf file reader.
- A text editor.
- An audio/video file player.

This course uses [Blackboard](#) for the facilitation of communications between faculty and students, submission of assignments, and posting of grades.

**Technical Help:** be sure to visit the following links if you face technical difficulties.

*Campus Network or Blackboard Outage:* when access to Blackboard is not available for an extended period of time (greater than one entire evening –6pm till 11pm) you can reasonably expect that the deadline for assignments will be extended 24 hours.

For technical support visit the Stony Brook University [Division of Information Technology website](#).

For assistance after regular hours or over the weekend, please contact the [Open SUNY Technical Support](#).

Frequently asked questions about the Bb LMS along with tutorials are available [here](#).

The [Student Summer Tech Guide](#), written by SBU students, is great website for general advice and information.

**Academic Support:** the following links provide you useful resources to participate and submit papers in this class.

*Student Support for Online Learning:* [check here](#).

*Library Instruction Website:* [check here](#).

*SBU Library Research Guides and Tutorials:* [check here](#).

**Netiquette Guidelines:** The following are guidelines for participation in the Discussion Forums:

- Remember that the absence of face-to-face communication it is easy to misunderstand what is being said;
- Carefully review and read materials that you receive electronically to ensure that you fully understand the message;
- Be sure to carefully re-read and understand what you will be sending in order to ensure that you are not misunderstood by anyone;
- Avoid cluttering your messages with excessive emphasis (stars, arrows, exclamations);
- If you are responding to a message, either include the relevant part of the original message in your message, or make sure you refer to the original content so as to avoid confusion;
- Be specific and clear, especially when asking questions;
- If your messages can be typed in UPPER and lower case, please use the two appropriately instead of all UPPERCASE characters. This gives the appearance of shouting and makes the message less readable;
- Remember that not all readers have English as their native language, so make allowance for possible misunderstandings and unintended discourtesies.

**Students with Disabilities:** If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the [Student Accessibility Support Center](#), 128 ECC Building, (631) 632-6748, or at [sasc@stonybrook.edu](mailto:sasc@stonybrook.edu). They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information [click here](#) and search Fire Safety and Evacuation and Disabilities.

**Academic Integrity:** Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, and Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the [academic judiciary website](#).



**Critical Incident Management:** Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the [Undergraduate Bulletin](#), the [Undergraduate Class Schedule](#), and the [Faculty-Employee Handbook](#).

**Valid Excuses:** During the course many possible events may occur that would result in your inability to complete your assignments or perform at a minimally acceptable level during an examination. Illness or injury, family emergencies, certain University-approved curricular and extra-curricular activities, and religious holidays can be legitimate reasons to miss to be excused from a scheduled examination. If you have a valid excuse, please discuss it with your instructor as soon as possible.

**Course Materials and Copyright Statement:** Course material accessed from Blackboard, SB Connect, SB Capture or a Stony Brook Course website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder is a violation of the Federal copyright law, as well as a violation of Stony Brook's Academic Integrity and [Student Conduct Code](#).

**Disclaimer:** Any change in the syllabus will be announced by email and in the *Announcements* section in the course website. You are expected to check your email and to log-in into the course website regularly.