1. **Text:** The following text is optional (not required): *Games & Information*, by Eric Rasmussen
   A few Study Guides will be sent your GMU email, to help supplement some of the topics shown on the 2nd page. So be sure your GMU email address is linked to this class.

2. **Readings:** Additional readings will also be used, and will be emailed to you later in the term.

3. **Office Hours:** Tuesday, NOON - 1 pm, at Carow Hall. Other times by appointment (just ask before or after class). If possible, I will answer questions just after class when that is more convenient for students (avoiding the extra time to meet at my office in Carow Hall). Carow Hall is located off of Shenandoah River Lane across from Presidents Park dorms.

4. **Goals & Requirements:** This course will give an introduction to game theory concepts, and then focus on the prototypical case of “cooperation versus conflict”, called the Prisoners’ Dilemma. Both traditional and new approaches to this prototypical case will be discussed. Lectures on traditional approaches will use certain chapters from Rasmussen’s text. Lectures on newer approaches will use the set of readings mentioned in topic 2 above. Problem sets will be given to provide practice on key concepts and feedback on students’ understanding. A midterm will be given, and a comprehensive final exam will also be given. Students also need to have background in econometrics and/or probability & statistics classes, because most topics will use probability concepts extensively.

5. **Content & Instruction Methods:** Most classes will be a mixture of lecture and discussion. Student comments and questions are encouraged and recommended for everyone’s benefit (for more enjoyable and better understood ideas).

6. **Tests & Evaluation Methods:** No numerical scores are given for problem sets, only a check mark for turning in on time. So you cannot lose points on the problem sets. They are only to help you prepare and do well on the midterm and final exam.

   The midterm and final exams are worth 40% and 50% respectively. However, if your final exam score exceeds your midterm score by more than 10%, then the final exam will be weighted 70% of the total grade. Problem sets are worth 10% of the final grade. To receive the 10%, you must complete all the problem sets, with no more than 2 late. Problem sets are due the next class period after they are passed out.

   Also, if you are a student with a disability and you need academic accommodations, please see me and contact the disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office.

7. **Getting Started:** We will begin by introducing the basic idea of strategic behavior in games, in contrast with “price taking” behavior in perfectly competitive economic systems. Next we will discuss key game theory concepts like: actions versus strategies, players, payoff functions, strategic form payoff matrices, extensive form game trees, Nash equilibrium, dominant strategies, mixed strategies, behavioral strategies, perfect versus imperfect information, sequential versus simultaneous games, and so on. We will illustrate these concepts with a number of simple games, including key representative games about “cooperation” versus “conflict” situations, including the prisoner’s dilemma, and other games such as: pure coordination, chicken, battle of the sexes, etc.

8. **Disability & Honor Code** If you are a student with a disability and you need academic accommodations, contact Disability Services at 703.993.2474 or ods.gmu.edu. Academic accommodations need to be arranged through this office.


   Suspected cases of academic dishonesty including plagiarism will be sent immediately to the Honor Committee.
### Outline of Weekly Topics

<table>
<thead>
<tr>
<th>WEEK</th>
<th>Problem Set</th>
<th>Topics</th>
</tr>
</thead>
</table>
| 1 - 3|             | Introduction to game theory definitions and concepts  
Players, feasible actions, strategies (mapping from  
potential situations into feasible actions), payoff  
matrices, Nash equilibrium, dominant strategies  
1 Intro to the One–shot prisoners’ dilemma (PD)  
Mutual defection is the dominant strategy equilibrium  
(even when randomized strategies are permitted)  
2 Game trees & information sets  
3 - 4 | 3 Randomized Nash equilibria for the matching pennies game  
4 Causal trees and forecasting weather from joint causation, calculating  
signal correlations from causal probabilities, forecasting a player’s  
decisions from a jointly caused signal;  
| 5 - 6 | Freedom of will, and forecasting rational decisions  
Application to Newcomb’s Problem:  
5 first with perfect detection  
6 Second with imperfect detection  
7 Evolutionary game theory and evolutionarily stable strategies (ESS)  
One-Shot PD with contingent cooperators and perfect detection  
8 Spring Break, no classes  
9 Review and Midterm [Thursday]  
9 – 11 | 7 Signal Detection Principles and ROC Curves  
External versus internal signals, and overlapping density functions  
Raising internal signal reliability through cautious detection  
8 Applying signal detection to the one–shot PD  
Green beards, secret handshakes, and mimicry  
Thwarting mimicry by defecting when signals more typical  
among DD players are detected  
12 - 14 | 9 Analyzing evolutionary competition between CD versus non–CD  
behavior  
Robust dynamics toward CD behavior  
15 | 10 Predicting the equilibrium probability of cooperation  
Effects of fear, greed, and cooperation payoff differences  
Effects of face–to–face communication |
ADDONIAL READINGS  (electronic reserve in Johnson Center, password “france”)


2. David Heeger, “Notes on Signal Detection Theory,” New York University; at the following web site.
   http://www.cns.nyu.edu/~david/sdt/sdt.html
   Plus see the following related web site. It has interactive graphics that you can control with your mouse:
   [NOTE Go to: wise.cgu.edu/portfolio to check on whether signal detection demo will work ]
   http://wise.cgu.edu/sdtmod/overview.asp  [has several parts obtained by clicking “begin the tutorial” and then “next” at the bottom of each page]
   Note: If you have trouble with these web addresses, just type “signal detection tutorial” in the search window of your internet browser, and the above web sites will come up among the first several sites listed by your browser.

ADDITIONAL READINGS (electronic reserve in Johnson Center, password “france”)


2. David Heeger, “Notes on Signal Detection Theory,” Stanford University; at the following web site.

   http://sucia.stanford.edu/~lera/psych115s/notes/signal/

   Plus see the following related web sites. They both have interactive graphics that you can control with your mouse:

   http://wise.cgu.edu/sdt/sdt.html [single page with interactive graphics]

   http://wise.cgu.edu/sdt/overview.html [has several parts obtained by clicking “begin the tutorial” and then “next” at the bottom of each page]


RELATED BACKGROUND READINGS

On Two Hour Reserve:


Also available from the library :

