GVPT 390 – SPRING 2019
GAME THEORY

Professor Piotr Swistak, Department of Government and Politics and
the Applied Mathematics, Statistics and Scientific Computation
Program, office TYD 1140 G, tel. 405-4149, email: pswistak@umd.edu

Office hours: Tuesdays and Thursdays 12:00pm—1:00pm, TYD 1140 G or send me an email and we
will meet at any time that is convenient for you.

Lectures: TYD 1101, Tuesdays 2:00pm - 4:45pm.

Teaching Assistants: Dylan Hunt, Courtney Kaufman, Rick Mikulis, Ye Eun Park, Ben Reichard, Mark
Snyder, and Peter Villarubia will be our TAs. You can contact them at dhunt1@umd.edu,
ckaufma1@umd.edu, rickmikulis@gmail.com, eunpark527@gmail.com, breichar@umd.edu
msnyder9@umd.edu and pvillarr@umd.edu They will all hold their office hours in LEF 1221 on
Mondays, beginning Monday, February 18, Dylan 11:00am-12:00pm, Courtney 2:00pm-3:00pm, Rick
10:00am-11:00am, Ye Eun 3:30pm-4:30pm, Ben 1:00pm-2:00pm, Mark 12:00pm-1:00pm, and Peter
5:00pm-6:00pm.

IMPORTANT: THIS DOCUMENT MAY BE UPDATED THROUGHOUT THE SEMESTER.
PLEASE CONSULT FREQUENTLY.

Three important points to keep in mind: (1) this class is UNLIKE ANY OTHER
POLITICAL SCIENCE classes you might have taken, (2) game theory is a branch of
MATHEMATICS (please see “A Beautiful Mind”), (3) I tend to explain things in my own way
rather than follow a textbook, hence ATTENDING classes (from what students tell me) is very
useful if not necessary.
This is an introductory course in game theory, a field of applied mathematics. Game theory is a general theory of behavior and, as such, it is a part of social science. While game theory has been used in the social sciences since 1940s, its impact of the last three decades has been extraordinary and unprecedented. My objective is to provide a comprehensive introduction to modern game theory. We will cover theory of preferences, expected utility theory, and a variety of solutions concepts including iterated dominance, Nash equilibria, subgame perfect equilibria, evolutionary equilibria and others. Please keep in mind that the material is mathematical and students who are not comfortable with basic algebra, or are averse to mathematics, may find this class prohibitive and, most certainly, not to their liking. (I have had semesters where the set of students enrolled in this class at the end of the semester was half of what it was at the beginning.)

All materials for this class (e.g., syllabus, lecture notes, homework assignments, etc) will be posted on ELMS

**READINGS Books:**

**SELECTED READINGS ON ELMS:** Since publishers allow access to about 25% of copyrighted materials I took the liberty of scanning some of the required readings and posting them on ELMS. My selection is arbitrary and includes what I thought may be the most difficult parts of the material. These excerpts do not and cannot substitute for the entire assigned reading.

**WARNING**
Material in this class is mathematical—students are assumed to know basic mathematics/simple algebra at the high school level.

**MANDATORY GRADING**

**TESTS (60%):** There will be four mandatory tests. You are allowed to have a single page crib sheet for each test and exam. You cannot, however, use textbooks or any other notes. Calculators are allowed. The average of the four test grades will count as 60% of your class grade.

**HOMEWORKS (30%):** There will be seven homeworks. I will grade them for correctness but points will also be subtracted for incomplete or sloppy explanations. I will post homework solutions on the web, so late submissions will not be accepted and a missing homework will count as 0 towards your homework average. The average of your homework grades (all homeworks carry the same weight) will count as 30% of your grade.

**PARTICIPATION (10%):** Your attendance combined with class participation will count 10%.
DATES, DEADLINES AND COMMUNICATION: I will use ELMS/CANVAS email system to inform you about posted files, homework deadlines, upcoming tests, etc. Please make sure that your email address as listed with ELMS is current and working.

EXTRA CREDIT
One notorious problem that leaves everyone upset are borderline grades. 89%, for instance, is a B+ while 90% is an A-. This feels unreasonable, to say the least, and in my opinion it is both unreasonable and unfair. To solve this problem, we will use two tie-breaking tools: extra credit points for in-class competitions and the final exam.

CLASS PERFORMANCE—THE EXTRA CREDIT POINTS: Class performance, measured by in-class competitions, will count as follows: All extra credit points you have accumulated, if any, will be classified into four categories. Students in the top category will get an extra 3%, second highest, 2%, third highest, 1%, and lowest, 0%. To get extra credit percentage points you will need to have an above average number of points.

FINAL EXAM (TBA) An optional way to improve your grade is by taking the final exam. Final exam will count for 50% of your test grade. For example, suppose you have taken all tests and your average test score is 86%. In that case if you decide not to take the final exam, your class grade will be calculated with the 86% test average counting as 60% of your class grade. If, however, you take the final exam and score 94% on it, your class grade will be calculated with 0.5*86% + 0.5*94% = 90% counting as 60% of your class grade.

PERCENTAGE GRADES WILL TRANSLATE INTO LETTER GRADES as follows: A- for 90-92%, A for 93-96%, A+ for 97% up; and analogously for B (80’s), C (70’s) and D (60’s).

OTHER ISSUES
CRIB SHEET: All testing is closed book but you ARE ALLOWED to have a crib sheet—a single standard size sheet of paper with whatever information you want to put on it (both sides.)

SPECIAL PROBLEMS AND SITUATIONS: If you have any situation, e.g., medical, that can affect your performance in class you should let me know immediately and no later than a week after it happens. I may be able to solve the problem but only if you tell me about it early enough.

MISSING A TEST will not be allowed except for extraordinary circumstances like medical emergencies, jury duty, etc, for which, as our university requires, you will have to supply relevant documents (from the physician, court, etc). You have to inform me about such emergencies immediately and no later than a week after the missed test. If you neglect to document your absence within a week, I will assign zero points to a missed test; there will be no appeals.

LECTURES VERSUS READINGS: A good part of the material will not be contained in the readings and will only be presented in class. For this reason, you should not think about the readings as a substitute for what we do in class—consider them supplementary. Attending classes, for all I know from the past, seems necessary to do well in this course. Please don’t use NOTE(NET)BOOKS/LAPTOPS, PHONES and other electronic devices in class.
UNIVERSITY POLICIES

ACADEMIC INTEGRITY: The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.studenthonorcouncil.umd.edu/whatis.html.

MEDICAL EMERGENCIES: Campus Senate policy requires students who are absent due to illness/injury to furnish documentary support to the instructor. I require students to contact me by email or by phone prior to class time in which you indicate that you have an illness or an injury. You must provide written documentation verifying your illness/injury immediately upon your return to class. You will not be allowed to turn in missed assignments or make up quizzes, tests, papers, etc. if you have not provided this documentation. Documentation not presented to me in a timely manner will not be accepted. In addition, if it is found that you have falsified the documentation provided, I will refer you to the University’s Student Conduct Office.
SCHEDULE OF READINGS, HOMEWORKS AND TESTS

WEEK 1 (Feb. 5)
Introduction: Examples of Topics, Methods, and Solutions
Related readings: Raymond Wilder, pages 1621-1640 (on ELMS.)

WEEK 2 (Feb. 12)
HWK 1 posted
Choice under Certainty: Theory of Preferences
Related readings: Dixit, Skeath and Reiley Chapter 1 and Kreps, pages 7-11 (for those who like it short and mathematical) and Williams pages 47 and 49-50 (for those who want something less mathematical than Kreps.)

WEEK 3 (Feb. 19)
HWK 1 due
Choice under Uncertainty: Von Neumann-Morgenstern Expected Utility Theory and the Foundation of Game Theory
Related readings: pages 1-6 from D. Kreps’ “A Course in Microeconomic Theory” or Williams pages 63-68 (for those who want something less mathematical than Kreps.)

WEEK 4 (Feb. 26)
HWK 2 posted
Game Theory: Primitive Terms, their Properties and Interpretations
Related readings: Dixit, Skeath and Reiley Chapter 2 (excerpts from a different edition are on ELMS.)

WEEK 5 (Mar. 5)
HWK 2 due
Simultaneous-Move Games: Dominance Solvability and Nash Equilibria
Related readings: Dixit, Skeath and Reiley Chapter 4 (excerpts from a different edition are on ELMS.)

WEEK 6 (Mar. 12)
Test 1 on HWKS 1 & 2; HWK 3 posted
Sequential Games and Rollback Equilibria
Related readings: Dixit, Skeath and Reiley Chapter 3 (excerpts from a different edition are on ELMS.)
WEEK 7 (Mar. 19)

SPRING BREAK

WEEK 8 (Mar. 26)  HWK 3 due; HWK 4 posted

Simultaneous-Move Games: Mixed Strategies

Related readings: Dixit, Skeath and Reiley Chapter 7 (Watson Chapters 14, 15 and 16 recommended).

WEEK 9 (Apr. 2)  HWK 4 due

Mixed Strategies (cont.) and Sequential versus Simultaneous-Move Games and Subgame-Perfect Equilibria

Related readings: Dixit, Skeath and Reiley Chapter 7 and 8 (excerpts from a different edition are on ELMS) also Watson Chapter 22 is recommended.

WEEK 10 (Apr 9)  Test 2 on HWKS 3&4;  HWK 5 posted

Repeated Games

Related readings: : Dixit, Skeath and Reiley Chapter 11 and Watson Chapter 22 and Axelrod Part I.

WEEK 11 (Apr 16)  HWK 5 due

Folk Theorem

Related readings: Axelrod Part I and readings from the previous week continued.

WEEK 12 (Apr. 23)  HWK 6 posted

Evolutionary Games

Related readings: Dixit, Skeath and Reiley Chapter 13 and Axelrod Part II and III.

WEEK 13 (Apr. 30)  HWK 6 due; HWK 7 posted

The Evolutionarily Stable Strategies and the Evolution of Cooperation

Related readings: Bendor and Swistak (1997).
WEEK 14 (May 7)  Test 3 on HWKS 5&6; HWK 7 due

The Evolution of Norms

Related readings: Bendor and Swistak (2001).

WEEK 15 (May 14)  Test 4 on HWK 7

The Evolution of Social Structure