



GOSHEN COLLEGE
MATHEMATICS DEPARTMENT
MATH 250 GAME THEORY & MATH 350 ADVANCED GAME THEORY
FALL 2017

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| Catalog Description | Mathematical models of interactions among players: people, companies, nations, or genes. Concepts include strategy, preferences, equilibrium, efficiency, solutions, and fairness properties. Applications to biology, business, economics, politics, psychology, and theology are explored. Math 250 and Math 350 are taught simultaneously. Math 250 emphasizes modeling and application of techniques and has a prerequisite of Math 170. Math 350 emphasizes derivation and justification for game theory techniques and has a prerequisite of Math 211 and either Math 205 or 212. |
| Learning Objectives | <p>The student will</p> <ol style="list-style-type: none">1. Model real-world scenarios as games and interpret game solutions in the context of the scenario;2. Analyze games using a variety of solution concepts and mathematical techniques;3. Prove or disprove conjectured properties of games and solutions;4. Learn mathematics by reading, listening, exploring, and conversing in an effective manner;5. Explain and critique mathematical reasoning through speaking and writing in a precise and articulate manner in both informal and formal settings;6. Exhibit curiosity, playfulness, creativity, confidence, perseverance, interest in multiple perspectives, and a collaborative spirit. |
| Instructor | David Housman, SC 117, dhousman@goshen.edu, 535-7405, 574-612-7185 (cell) Office hours posted on office door and on Moodle |
| Class Time | TR 11:00 a.m. – 12:15 p.m. in SC 006. |
| Textbook | <p><i>A Brief Introduction to Game Theoretic Modeling</i> by Rick Gillman, David Housman, and Audrey Malagon. Drafts of this book will be made available as pdf files.</p> <p><i>Models of Conflict and Cooperation</i> by Rick Gillman and David Housman, American Mathematical Society, 2009 is a good resource especially if you are looking for a lower level treatment. Two copies are on reserve in Good Library.</p> |
| On-line | moodle.goshen.edu All students should go to Math 350 for course resources. |
| Software | Wolfram <i>Mathematica</i> will be used for computation and is available from any lab computer or via a virtual computer from any computer . If desired, you can purchase or rent a student license for your personal computer at http://www.wolfram.com/mathematica/pricing/students-individuals.php . |
| Notebook | A three-ring binder with loose-leaf lined and graph paper is recommended so that you can keep a written record of problem solving attempts, questions, math discoveries, and skill assessments. |
| Activities | <p>The study of mathematics is not a spectator sport! Reading, listening, solving problems, writing explanations, reflecting upon ideas, and receiving feedback are essential to learning mathematics. Read with paper and pencil in hand, and take an anticipatory approach: try to obtain solutions, explanations, and proofs before reading what the author provides.</p> <p>An average student can obtain an average grade with an average of nine hours each week devoted to this course—adjust if you are not average or desire a grade that is not average.</p> <p>Moodle will announce the reading and assignments for each week. Class will complement your preparatory reading and investigating through mini-lectures, game playing, discussions, and problem solving.</p> |
| Grading | Course grades will be based on performance on participation (10%), assignments (60%), and a project (30%). |
| Participation | Come to class and fully engage in the activities. Contributions to class discussion, success in game play, and performance on quizzes will be the factors considered in your grade. |

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| Assignments | Achieve and exhibit understanding by completing the assigned exercises. Complete the weekly assigned exercises by class time on Tuesdays. They will be graded and returned with feedback during class on Thursday. Revised solutions to individual exercises may be resubmitted the following Tuesday along with your original submission; a 30% penalty will be assessed on resubmissions. A core set of exercises will be assigned for all students. Math 250 students may be assigned additional computational or modeling exercises. Math 350 students may be assigned additional proof oriented exercises. |
| Project | Examine some game theory topic in greater depth, either individually or collaboratively. The final product will consist of a paper, group member evaluations, and a public presentation scheduled during the final exam period (Tuesday, December 12, 3:00 – 5:30 p.m.). Potential topics, mechanics, and grading criteria should be discussed with the instructor starting mid-October culminating in a written proposal by November 17. Details are available on Moodle. |
| Extra Credit | Receive extra credit toward your assignments grade by doing one or more of the following: (1) find errors in the text or posted course materials and describe the error in writing; (2) attend a quantitative presentation (e.g., Science Speakers) or participate in a quantitatively based activity and describe in writing some interesting mathematical aspect of the presentation or activity; or (3) participate in a Career Services event and describe your most important discovery. The description should be a substantive paragraph or two and be submitted to the instructor on paper. |
| Tutoring Assistance | The Math Think Tank (held in the Library Think Tank room on the basement level) is scheduled for Mondays and Fridays 10-10:50 a.m., Wednesdays and Sundays 8-10 p.m., and Thursdays, 2-3:50 p.m.. Drop in with your questions! If you would like to be part of a small study group led by a peer tutor, fill out the request form at http://tiny.cc/GCtutoring or drop by the Academic Success Center. |
| Disability Accommodation | Goshen College offers all students equal access to classes and programs. If you have a disability and wish to request accommodations, please contact Judy Weaver in the Academic Success Center (Good Library 113). You will be asked to provide documentation of your disability. All information will be held in the strictest confidence. Phone: 574-535-7560 ; Email: jweaver@goshen.edu . More information at: www.goshen.edu/campuslife/asc/disabilities-services/ |
| Other Assistance | Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students Gilberto Pérez Jr. (gperez@goshen.edu) for support. Furthermore, please notify the instructor if you are comfortable in doing so. He may be able to provide additional assistance or flexibility in meeting the requirements of the course. |
| Collaboration and Academic Integrity | <p>You are encouraged to use all available resources in order to learn the concepts and techniques discussed in this course. In particular, conversations with other students and the instructor can be an effective learning method. Reading other books and web pages can be another effective learning method. However, copying someone else's work subverts the learning process.</p> <p>For assignments and the project, you may look at and discuss another student's work, but any written work developed during collaboration with another student should be destroyed before writing your own solutions. You should give written acknowledgement to people with whom you have had discussions and to any written materials (other than the text) that were helpful.</p> <p>Failure to observe the above rules will result in a zero on the assignment or exam. Any violation of academic integrity will be reported to the Academic Dean. Observation of the above rules will help you learn the material well and give you the satisfaction of knowing that you have earned your grade.</p> |
| Due Date Policy | Class participation, assignments, and the project can only be excused, rescheduled, or made up if (1) there is a serious medical problem, a death in the immediate family, or an irreconcilable conflict with another official Goshen College activity; (2) there is written documentation signed by proper authorities; and (3) the instructor is notified prior to the due date or as soon as possible afterwards. |