PROFESSOR	Dr. Rebekah B. Johnson Yates OFFICE: Library 131

EMAIL: rebekah.yates@houghton.edu

OFFICE HOURS: Monday 1:30–2:25 PM, Wednesday 10–11 AM, Thursday 2–3 PM

In person is the best way to contact me. Email is the next best way. Please note that emails sent on Sunday will not receive a response until the next day.

LOCATION/TIME   MWF 2:30–3:35 PM in Library 140.

TEXT (REQUIRED)   *Game Theory and Strategy* by Philip D. Straffin, published by MAA Press

MATERIALS AND COMMUNICATION   All assignments and other course materials beyond the textbook will be posted on our class website https://facultysites.houghton.edu/rebekahyates/GameTheory.htm. Announcements will be posted there and/or communicated by email, so you should check your Houghton email at least once a day during the semester. If you miss class, it is your responsibility to determine what you have missed by checking the website and asking a classmate.

COURSE OBJECTIVES   In this course, students will

- learn some of the basics of game theory.

- begin to develop the ability to understand and construct game theory proofs.

- explore applications of game theory in various contexts.

DAILY WORK   Each class day (almost), you will have three parts of an assignment:

I. Reading and inquiring: due at the beginning of class. These assignments will be graded on completion with a good faith effort. We will discuss your work for parts (a)–(c), and you will turn it in occasionally, but you will keep your notes for yourself separately as we will not spend class time writing down definitions that are already in our readings. Assessment for this part will be included in the participation category.

   (a) Read and respond: read the assigned material, rereading as needed. Reading mathematics is an active process: have a writing utensil and paper ready to take your own notes and work through parts that seem unclear to you. Write your clear responses to the assigned reading/reflection questions.

   (b) Ask questions: Write down your own questions from the reading (e.g., new or old concepts you find confusing, connections to other ideas, examples you thought of, misconceptions that were clarified) and be ready to ask the questions in class. Note: many of your questions will come up as you are reading, so if you need to change the order of parts (a) and (b), feel free to do so—just label them clearly.

   (c) Quantify: record how much time you spent on Part I.

II. Exercises: For these introductory/warmup/review exercises, work individually and then consult with me and other class members outside of class time. You will present some of these to the class, and you will respond to your classmates' presentations with questions, comments, suggestions, and further ideas. As such, you need to complete or at least seriously attempt each of the exercises each class day so that you are prepared to engage in the class discussion around the exercises. Assessment for this part will be included in the participation category.

III. Problems: assigned (almost) each class day after we've discussed the relevant material in class and due as a hard copy at the beginning of class on Wednesdays. Work on these on your own and then consult with other class members and with me as needed. Finally, write your solutions by yourself without comparing them with other people's solutions. The solutions you hand in should be entirely your own. You are encouraged to type your solutions using LaTeX. Each submission should be labeled with the corresponding Daily Work number. Multiple pages must be stapled in order. Note: while you are welcome to use textbooks as resources (but not to copy solutions from them), looking at solutions on the internet and using generative AI is not acceptable and will be reported to the Provost's Office as an academic integrity violation with the accompanying consequences.

DAILY WORK
CONTINUED

The majority of problems will be proofs; what you turn in should be a final, polished proof, written after you've done scratch work and drafts on other paper. If you do not have a final, polished proof at the due date, write up what you can and turn it in so that you can earn an R and get feedback toward a revision. Not turning something in will result in an N and you will lose the option to revise that problem. Each problem will receive feedback and one of the following marks:

E xcellent: the solution/proof uses correct logic, applies appropriate proof techniques well, has excellent clarity, precision, reasoning, flow, organization, and notation.

M eets Expectations: the solution/proof uses correct logic with perhaps one or two details unclear, applies appropriate proof techniques well, is easily understandable with reasonable clarity, precision, reasoning, flow, organization, and notation.

R evise: the solution/proof makes a reasonable attempt to address the problem but has several holes, logical flaws, issues with precision, clarity, organization, or notation that require revision.

N ot Assessable: there is no reasonable engagement with the problem.

Problems that earn an R can be revised and resubmitted, with a maximum of 2 resubmissions per week per student. Resubmissions must also include a short reflection on what was incorrect the first time and how your understanding has changed with your revision. Revisions can be turned in at any during the week.

CLASS TIME

Class periods will require your active involvement. Come prepared to be engaged in your learning. Choosing not to actively participate will adversely affect your grade. Most classes will consist of discussion of questions from the reading, presentations of Part II problems, and small group work.

MINI-
CELEBRATIONS
OF LEARNING

Each Friday in class we'll have a mini-Celebration of Learning. Mini-Celebrations of Learning will generally consist of stating definitions and results, giving examples or counterexamples, and standard problems/proofs. Mini Celebration of Learning problems will be graded as "Meets Expectations (M)" or "Does Not Meet Expectations" (N), and problems that earn an N can be revised and resubmitted within one week of receiving the graded work. Each quiz problem revision must be accompanied by a short reflection on what was incorrect the first time and how your understanding has changed with your revision.

FINAL PORTFOLIO

You will create a portfolio showing your learning from this course as your final assessment. The porfolio will include problems that you've created related to the topics we've covered in class as well as at least one of the following three things: a game you created and your analysis of the game, an already-existing game that you explain and analyze, or an application of game theory that you researched and explained with some original examples. Your portfolio will be due on the last day of class, Friday, December 12, and you will do a 10–15 minute presentation for the class on your game/application on the last day of class or during the final exam period. Assignments for the portfolio will be given on Daily Work assignments throughout the course.

IN-CLASS
PARTICIPATION

You are expected to attend class, be prepared for class, and actively participate in all class activities. At the end of the semester, you will submit a proposed participation grade with justification using the guidelines below. I reserve the right to assign a different grade than you give yourself if I judge that you have graded yourself incorrectly.

- **To earn an A**, complete all Part I and Part II assignments and be ready to present each day for all but at most 1 day, regularly comment usefully on others' presentations and ask questions that highlight key ideas, and contribute ideas and listen carefully to others during group work. You should present at least once a week to earn an A.

- **To earn a B**, complete all Part I and Part II assignments and be ready to present each day for all but at most 2 days, regularly comment usefully on others' presentations and ask questions that move the class discussion forward, and contribute ideas and listen carefully to others during group work. You should present at least 6 times to earn a B.

- **To earn a C**, complete all Part I and Part II assignments and be ready to present each day for all but at most 4 days, listen carefully to and occasionally comment usefully on others' presentations and ask questions and offer insights during class discussions, and contribute some ideas and listen carefully to others during group work. You should present at least 4 times to earn a C.

- There is no description for a **D or F** because these grades represent a fundamental breakdown of expectations. A D represents a meaningful but unsuccessful attempt at earning a C or above. An F represents such a severe lack of engagement, effort, or understanding that there is no evidence of meaningful progress (credit to David Clark and Robert Talbert for this paragraph).

GRADING

Your grade will be based on Part II, Part III, mini-Celebrations of Learning, in-class work/participation (including Part I), and the final portfolio with presentation.

Your final base course grade (without a plus or minus) will be assigned based on the following chart:

Base Grade	Part III %E	Part III %M	m-CoL %M	Portfolio	Presentation	Participation
					grade	
A	30	55	90	A	A	A
B	15	60	80	B	B	B
C	0	65	70	C	C	C
D	0	55	60	D	D	D

- To earn a particular grade, you need to meet the minimum listed in each vertical column of that base grade's horizontal row. The guidelines in the table above are the minimum requirements for earning that particular grade; exceeding requirements (e.g., earning an M on 100% of your HW problems) also meets the requirements for that grade. Note: I reserve the right to change the minimums, but I will never increase them; i.e., any change I make will only maintain or benefit the grade this chart and the notes below would assign.

- If you do not meet all the requirements for a D, you will earn an F for the course.

- **Plus/minus grades**: If you meet all the minimum requirements for a base grade *and* two of the Part III/m-CoLs/Portfolio/Presentation categories meet the minimum requirements for the next higher grade *and* your in-class participation has been consistently positive, you will earn a plus on your grade (unless you already have an A as Houghton does not give A+'s).

  If you meet all the minimum requirements for a base grade (e.g., B) except one, and that one is in the next lower category, you will earn a minus on your grade (e.g., B-).

  If you meet all the minimum requirements for a base grade *and* your in-class participation has been inconsistent or has negatively impacted the class environment on more than one occasion, you will earn a minus on your grade.

ATTENDANCE

If you are unable to come to class, please let me know as soon as possible. Since class time involves your active participation, missing class without a valid excuse will adversely affect your grade.

ACADEMIC INTEGRITY

Honesty is the foundation on which all intellectual endeavors rest. To use the ideas of others without acknowledging the authors of those ideas belies the nature and purpose of academic life. At Houghton, where we strive to live out Christian calling and commitment, personal integrity, including academic honesty, should be the hallmark of all our work and relationships. Houghton's full Academic Integrity Policy, including procedures for addressing violations, can be found in the Academic Catalog: https://www.houghton.edu/undergraduate/majors/academics/catalog/

Any work or writing you turn in should be your own, and you are responsible for ensuring that you do not copy anyone else's work or writing (this includes not copying things from the internet or using generative AI). See III. Problems for further information about completing assignments.

ACCOMMODATIONS

If you have an academic or physical disability that requires accommodations please contact the Academic Support and Accessibility Services in the Center for Student Success located on the first floor of the Chamberlain Center (585–567–9622). With appropriate documentation, you will be afforded the necessary accommodations. For more information about Academic Support and Accessibility Services go to https://www.houghton.edu/undergraduate/student-life/student-success/.

TENTATIVE
SCHEDULE

This schedule is subject to modification throughout the course.

Week 1	Ch. 1–3
Week 2	Ch. 4–7
Week 3	Ch. 8–10
Week 4	Ch. 11–12
Week 5	Ch. 13–15
Week 6	Ch. 16–18
Week 7	Ch. 19–21, portfolio presentations

DEPARTMENTAL
OUTCOMES

This course addresses the following Houghton Math Department Learning Outcomes for mathematics majors.

- Effective Thinking and Communication: Students will develop effective mathematical thinking and communication skills.

- Liberal Arts: Students will explore and articulate ways in which mathematics is essential to a liberal arts education and informs and enriches a Christian life.

- Persistence: Students will experience open-ended inquiry and demonstrate persistence in solving problems.

- Independent Work: Students will develop the ability to solve a variety of mathematical problems independently.

- Collaborative Effort: Students will develop the ability to collaborate with others in solving mathematical problems.

INSTITUTIONAL
OUTCOMES

Though not explicitly assessed in this course, learning in this course addresses the following Houghton Essential Learning Outcomes: Christian faith, critical thinking, logical & quantitative reasoning, and ethical reasoning.