#### BUILD SKILLS

In order to beat the boss, you and your team must acquire many skills and ensure that you have perfected them. When you attack and demonstrate your abilities, you are rewarded with points. If you score enough, you can easily escape. The breakdown of points is as follows:

Skill building exercises (homework) Lab experiments (labs and gameplay) 20% Perserverance (attendance) 10% Squad patrol (team work) 20% The boss battle (final project) 30%



#### GAME OBJECTIVES

- 1. What is a game? What is a good strategy? These questions are related to various computation models and their similarities.
- 2. How do different game mechanics affect strategy and hardness?
- 3. What puzzles can be solved? This question is about computability.
- 4. What games can I win? This question is about computational complexity.



- Tim Wylie, Ph.D. -

Course Description. This course provides an overview of the complexity of games and puzzles. The topics include hardness results and complexity classes with constraint logic reductions, combinatorial game theory, and standard game theory. The final report for each group summarizes weekly objectives, complexity, programming assignments, CGT endgame positions, and other related work. Additional topics may include some basic ML techniques, and elements of game design. Prerequisites: CSCI 3310 (any discrete Math equivalent) and CSCI/CMPE 3333.

Course Topics. This course provides an overview of the computational complexity of games and puzzles (one-player games). This includes, but is certainly not limited to, hardness reductions, complexity classes, dealing with hard problems, combinatorics, surreal numbers and combinatorial game theory, standard game theory, randomness, tilings, etc. We will also touch on some basic A.I. techniques and game design.

Late Work Policy. Labs and exercises will be accepted late, but with penalty. Assignments must be turned in at the specified time on the given due date. Afterwards, the penalties are as follows:

- · Within 24 hours late will lose 10%.
- · Within 48 hours late will lose 20%.
- · More than 48 hours late will lose 50%.

Make-up Policy. No make-up exams will be given except for university sanctioned excused absences. If you need to miss an exam, it is your responsibility to contact me before the exam, or as soon after the exam as possible. Missing an exam without an approved (by the university or me) excuse will

Learning Outcomes. Upon successful completion of this course, students will be able to do the following:

- 1. Be able to reduce known problems to unknown problems in order to prove their computational complexity.
- Identify and prove that certain problems and games are in a complexity class.
- 3. Be able to approach an unknown game and prove its complexity or demonstrate why it is difficult.
- 4. Determine good heuristics and methods for playing games.
- Basic Artificial Intelligence to effectively play certain games and when certain app roaches are ineffective or infeasible.
- 6. Have a basic understanding of combinatorial games and surreal numbers.

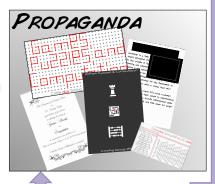


Did you know there are several ways to get bonus points in the game and level up faster?

The bonus quests include:

- 1. Reading research papers
- 2. Reading other books
- 3. Additional problems
- 4. Completing things early





## SQUAD

Your group, party, team, possee, the people who will help you survive this quest. You must pick at least 3 team members to round out your squad. Pick your role

SCHEME

TR 2:00 - 3:15 p.m.

EMAGC 2.206











The evil genius and mad scientist Dr. Wylie has trapped you in a world of theory and drudgery. He desires to fail everyone, and lured you and your companions under the appearance of fun. You must arm yourself and race against time to stop him. On this epic quest you must face your fears, fight impossible odds, and accomplish amazing feats of perserverance and intelligence.

Your party of travelers will be pushed through numerous puzzles and challenges to escape the course successfully, and to test your mental agility. This requires many advanced fighting techniques that you must master.

Escape . . . if you can.

START Winning at this class starts with a desire to learn and a willingness to put it is the ness to put in the effort required...

Rule 7 The only rule is work Rule 8 SECHET REPRESENTATION REPRESENTATION OF THE PROPERTY OF Rule 10 SHEWHALLS ALGED THE BUELD BEILD BY

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Website. http://academic.timwylie.com/19CSCI4341F/CSCI4341.html

Creating Documents IATEX Image Editing Gimp, Photoshop Layout Editing Inkscape Programming

Python, Java, CGSuite, etc. Mathematics proofs, formality, discrete structures, etc.

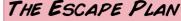
#### TOPICS

The topics you'll be exposed to will vary quite substantially. However, a rough schedule is given to feed your dread.

Week 1. Form groups, intro to games Weeks 2-3, Impartial combinatorial games Weeks 4-5, Partizan combinatorial games Weeks 6-7, Introduction to constraint logic Weeks 8-9, Hardness proofs Weeks 10+, Advanced topics, project work

Every week there will also be labs where we'll discuss some of these topics.

SPELLBOOKS



Using your savy skills you need to design a plan (a game) to help confuse the evil scientist. This will require some serious design and imagination in a MacGuyveresque level of genius hackery. Your aim is to impress and confuse with something challenging, and yet fun.

# THE BORING. YET IMPORTANT. RULES

- The University of Texas - Rio Grande Valley -

The boring, yet important, rules (BYIR) are necessary for the class to be successful, and to inform you of the laws. The basic idea is to B - YIR best by following the rules.

Attendance. Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGVs attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; for observance of religious holy days; or for military service. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

Drop Class Policy. According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the 3-peat rule and the 6-drop rule so they can recognize how dropped classes may affect their academic success. The 6drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time. The census date is Sept. 11th, which is the last day to drop the class without it appearing on your transcript, and the last date to drop is Nov 13th.

Students with Disabilities. Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive academic accommodations should contact Student Accessibility Services (SAS) as soon as possible to schedule an appointment to initiate services. Accommodations can be arranged through SAS at any time, but are not retroactive. Students who experience a broken bone, severe injury, or undergo surgery during the semester are eligible for temporary services.

Scholastic Integrity Policy. As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism, and coll-usion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regul-

Course Evaluation. Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu); you will be contacted through email with further instructions. Online evaluations will be available Nov. 14<sup>th</sup> - Dec. 4<sup>th</sup>. Students who complete their evaluations will have priority access to their grades.

ations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents

will be reported to the Dean of Students.

Sexual Misconduct and Mandatory Reporting. In accordance with UT System regulations, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and so must report any instance, occurring during a students time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. Info can be found at utrgv.edu/equity, including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect in an environment free from sexual misconduct and discrimination. If students, faculty, or staff would like confidential assistance, or have questions, they can contact OVAVP (Office for Victim Advocacy & Violence Prevention) at 665-8287, 882-8282, or OVAVP@utrgv.edu.

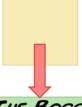




to Dec. 4, 2019



Dec. 10, 2019 1:15 - 3:00 p.m. EMAGC 2.206



### THE BOSS BATTLE

There's only one way to beat an evil scientist: you have to outsmart him! With your squad working together, you must research and write how to defeat the evil game he has assigned to you. This includes proving its complexity, showing how to approach it (in some useful way), and writing an A.I. to beat the evil mastermind at his own game!



## ABET OUTCOMES (1) An ability to analyze a problem, and to identify and define the computing requirements app-

ESCAPE

By your own clev-

erness you escape

and earn a nod of

respect from the

mastermind.

ropriate to its solution.

(2) An ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of the

(3) An ability to communicate effectively with a range of audiences about technical information.

(5) An ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables.

(6) An ability to apply theory in the design and implementation of computer-based solutions.





Disclaimer. Dr. Wylie is not really an evil scientist who has lured you into a trap with the hopes that he will keep you from graduating. Or is he?