APPLIED GAME THEORY

1. **DESCRIPTION:** Teams will explore basic concepts in Game Theory and will apply these concepts in games against one another.
   A TEAM OF UP TO : 2   **APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:**
   a. Teams must bring writing utensils and may bring up to two stand-alone non-programmable, non-graphing calculators.
   b. Each team may bring one 8.5"x11" sheet of paper, which may be in a sheet protector sealed by tape or laminated, that may contain information on both sides in any form from any source without any annotations or labels affixed.

3. **THE COMPETITION:**
   a. The event will consist of a written exam. Portions of the exam may consist of communication with other teams and/or the Event Supervisor(s). All teams will have the same amount of time to complete the exam and score as many points as possible.
   b. Points within each section are worth the same.
   c. **Part I: Game Theory Knowledge (50%)**: Students will be tested on their knowledge of basic game theory concepts.
      i. Representations of games (e.g. extensive form, normal form)
      ii. Different game types (e.g. zero-sum vs non-zero-sum, cooperative vs non-cooperative, symmetric vs asymmetric)
      iii. Equilibrium concepts (e.g. pure and mixed Nash equilibria, pareto efficiency)
      iv. Strategy concepts and categorizations
      v. Classical games (e.g. prisoner's dilemma, vickery's auction, stag hunt)
   d. **Part II: The Games (50%)**
      i. Teams will answer a set of questions that rely on anticipating the behavior of other teams.
      ii. Teams may also be asked to participate in an interactive component in which they may be paired with other teams in their time slot (or the ES in the case of an odd number of teams) to play multi-round games.
      iii. Teams may be asked meta-questions about the expected performance of themselves or other teams in this event.
      iv. Scores for this section of the exam may be dependent on the answers provided by other teams as well as from the results of the games the team participated in.
   e. Approximately 10 minutes after the start of the event, the Event Supervisor will begin administering Part II. The interactive portion of Part II of the exam should last no longer than 20 minutes.

4. **SAMPLE QUESTIONS/TASKS:**
   a. Part I
      i. Given a description of a game, represent the game in normal and extensive form.
      ii. Given a representation of a game, identify the Nash equilibrium.
      iii. Identify a dominant strategy from the normal form representation of a game.
   b. Part II
      i. Pick a number in the range [1, 100] that you believe to be closest to 80% of the average number selected for this question across all teams.
      ii. Play prisoner's dilemma with a randomly selected team.

5. **SCORING:**
   a. The team's raw score is the sum of the scores of the two parts of the exam.
   b. The team's raw score may then be adjusted based on answers provided in Part II of the exam to obtain their final score used for placement.
   c. Highest score wins.

d. Specific questions will be indicated as tiebreakers on the exam.