

CS 680: Game AI, Winter 2012

Class time & location: **TBA**

Instructor: Dr. Santiago Ontañón

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Course Goals

This course focuses on advanced artificial intelligence topics for computer games. It covers several cutting-edge game AI research topics that have direct applications in commercial and serious games. The goal is to increase students' comprehension of current game AI techniques, develop their technical skills for developing game AI, and to gain research experience in these topics.

In particular, we will focus on the following topics in the course:

- **AI for Real-Time Strategy (RTS) Games:** Unlike in traditional games such as Chess, state of the art AI in commercial RTS games (e.g. Starcraft) is not challenging enough for human players. We will study recent advances in RTS game AI aiming at providing challenging artificial opponents for human players.
- **Drama Management (DM):** Not all players like the same kind of experiences. Drama management is a recent trend, both in industry (e.g. Left 4 Dead 2) and in academy, that aims at automatically adapting a game to the player at hand, in order to, for example, provide an enjoyable experience to a broader set of players.
- **Procedural Content Generation (PCG):** PCG focuses on automatically generating levels, quests, stories, characters, etc. and even if it has been in some commercial games (e.g. Daggerfall) is still subject of active research in academia. We will specifically focus on story and level generation.

Prerequisites

For CS 680: some course on Artificial Intelligence or special permission from instructor.

Evaluation

In addition to class attendance, students will prepare three projects, and will be assigned one paper to read and present in class. Grades will be assigned based on the following:

- Project 1: 25%
- Project 2: 25%
- Project 3: 25%
- One paper presentation in class: 15%

- Attendance and class participation: 10%

Assignments and projects submitted after the specified deadline may not be accepted. Plagiarism and other academic misconducts will be reported to the department. More details refer to The Drexel University Student Handbook.

Students are responsible for checking their Drexel email account daily for course announcements. If you have any question about a project or assignment, please email the instructor at least 24 hours before the deadline.

Tentative Schedule

All readings and projects are due before class.

Block 0: Introduction

Week 1: Introduction: Artificial Intelligence in Computer Games.

Project 1 and paper presentation assigned

Block 1: Real-time Strategy games

Week 2: Introduction to AI in RTS Games

- 1) *"Real-Time Strategy Games: A New AI Research Challenge"* Buro
- 2) *"Evolution of RTS AI"* Fitch

Week 3: Path-finding in RTS Games

- 1) *"Game AI Programming By Example"* Buckland (Ch 8)
- 2) *"Artificial Intelligence for Games (2nd ed)"* Millington, Funge (Ch 3.7)

Week 4: Decision-making in Strategy Games

- 1) *"Artificial Intelligence: A Modern Approach"* Russell, Norvig (Ch 5)
- 2) *"Adversarial Planning Through Strategy Simulation"* Sailer, Buro, Lanctot
- 3) *"A Tutorial Introduction to Decision Theory"* North

Block 2: Drama Management

Week 5: Introduction to Drama Management

- 1) *"Structuring Content in the Façade Interactive Drama Architecture"* Mateas
- 2) *"Search-Based Drama Management in the Interactive Fiction Anchorhead"* Nelson, Mateas

Project 1 due, Project 2 assigned

Week 6: Player Modeling

- 1) *"Player Modeling for Interactive Storytelling: A Practical Approach"* Thue, Bulitko, Spetch
- 2) *"Player Modeling for Adaptive Games"* Houlette

Week 7: Story Evaluation

- 1) *"Guiding Interactive Drama"* Weyrauch (Ch 2,3,4)

Block 3: Procedural Content Generation

Week 8: Introduction to Procedural Content Generation

- 1) *"Procedural Content Generation for Games: A Survey"* Hendrikx, Meijer, Van Der Velden, Iosup
- 2) *"Search-based Procedural Content Generation: A Taxonomy and Survey"* Togelius, Yannakakis, Stanley, Browne

Project 2 due, Project 3 assigned

Week 9: Automatic Story Generation

- 1) *"Tale-Spin, an Interactive Program that Writes Stories"* Meehan
- 2) *"The SAM Algorithm for Analogy-based Story Generation"* Ontañón, Zhu

Week 10: In-class Activity

Project showcase and critique session

Week 11: Project 3 due