



# Multiplayer Game Programming

## ITP 484x (4 Units)

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**Objective** Interactivity is one of the most important features of a game, thus a solid understanding of interactivity theory and implementation is essential for any game programmer. This is only more true when programming multiplayer online games. This course introduces students to the tools and techniques used to make multiplayer games function seamlessly online. Students are led through the entire process of creating a fully functional online game, complete with a platform-independent network library and back-end database. In addition, interviews with industry leaders will be examined to provide students with professional insight into online game development, the unique features of online game design and various approaches to interactivity.

**Concepts**

- Multiplayer Online Game Interactivity
- Back-end Databases
- Sockets Programming
- Creating Platform and Protocol Independent Network Libraries
- Creating Game Login and Lobbies

**Prerequisite** CS102L or ITP165x

**Lecture** 3 hrs/week

**Lab** 2 hrs/week

**Required Textbooks**

- *Online Game Interactivity Theory*, by Markus Friedl, Charles River Media. 2003. ISBN: 1-58450-215-0.
- *Developer's Guide to Multiplayer Games*, by Andrew Mulholland and Teijo Hakala, Wordware Publishing, Inc. 2002. ISBN: 1-55622-868-6.

**Grading** The following point-structure will be used in determining the grade for the course. Final grade will be based upon the total points received, the highest total in the class, and the average of the class.

Labs	25%
Midterm	20%
Final Project	25%
Final Exam	30%
Total	100%

**Examinations** Exams cover material from the reading assignments, lectures, and lab projects. The exams are both closed book and closed notes. The exams will cover the material presented up to the date of the exam. The Final exam is not considered to be cumulative, though knowledge of the material presented during the earlier part of the semester may be helpful in answering some of the questions on the Final.

**Students with Disabilities** Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to your lab assistant) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

- Policies**
- Make-up policy for exams: In order to make up for a missed exam, the student must provide a satisfactory reason along with proper documentation. Usually make-ups are allowed only under extraordinary circumstances.
  - Projects: It is YOUR responsibility to turn in your lab projects on, or before, the deadlines as set by the instructor.  
IT IS NOT THE RESPONSIBILITY OF THE LAB ASSISTANT!
  - Late Projects: Late submission of projects will lead to loss on points, so please turn in your projects on time! No projects will be accepted after 2 weeks beyond the project's original due date. Everything regarding a project should be settled within 2 weeks of the project's due date.
  - Due Dates: All projects must be submitted by midnight on the due date.
  - Though working together is encouraged, the projects must be your own effort. "Duplicate" projects will all receive zero points and possible referral to the Office for Student Conduct.
  - All students should abide by the University Student Conduct Code <http://www.usc.edu/dept/publications/SCAMPUS/governance/gov03.html>

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## Course Outline

### Week 1 – Forethought

- History of Multiplayer Online Games
- The Market Today
- The Human-Game Relationship
- Learning
- Mastery
- Escape
- Social Event
- Secluded Activity

**Reading Assignment:** *Online Game Interactivity Theory* Chapters 1-2

**Lab:** None

### Week 2 – Perspective and Understanding

- Understanding Online Games and Online Game Design
- Specialties of Multiplayer Online Games
- Creating Windows Applications in Visual Studio

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 3

- *Developer's Guide* Chapter 1

**Lab:**

- Create a 2D Library

### Week 3 – Analysis and Categorization

- Online Integration
- Technology
- Genre
- Purpose of Play
- Business Model / Distribution Channel
- Internet-Based Database Systems
- Overview of MySQL
- Creating a Database in MySQL

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 4

- *Developer's Guide* Pages 15-45

**Lab:**

- Install MySQL

### Week 4 – Conceptualizing Interactivity

- The Importance of Interactivity
- The Interactivity Concept
- Benefits and Profits
- Relational Databases

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 5

- *Developer's Guide* Pages 46-90

**Lab:**

- Create a Database

**Week 5 – Player-to-Computer Interactivity**

- Synchronicity and Quality
- Controls and Interface Devices
- Command Set
- Network and Network Transparency
- Interactivity Focus
- Artificial Intelligence
- Real-Life Simulation
- System Knowledge and Learning Curve
- Communicating with the Internet using Perl
- Installing the Perl Database Interface
- Connecting and Disconnecting
- Retrieving and Displaying Data

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 6
- *Developer's Guide* Pages 91-128

**Lab:**

- Retrieve data using the Perl DBI

**Week 6 – Player-to-Player Interactivity**

- Range of Potential Partners
- Freedom to Define the Range of Potential Partners
- Knowledge of Partners
- Knowledge of the Game Environment
- Variety of Interaction Channels
- Case Study: GameSpy Arcade
- Adding New Data in Perl
- Using the Unique ID Field
- Adding a Search Facility

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 7
- *Developer's Guide* Pages 129-180

**Lab:**

- Add data using the Perl DBI

**Week 7 – Player-to-Game Interactivity**

- Spatial Representation
- Mapping
- Media Personalization
- Atmosphere
- Content Creation
- TCP/IP
- Ports
- Sockets

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 8
- *Developer's Guide* Chapter 4

**Lab:**

- Create a Network Library

**Week 8 – Midterm**

**Reading Assignment:** All prior material

### **Week 9 –Sockets Programming**

- Designing the Game Character
- WinSock Initialization
- Error Handling
- Address Structures
- Basic Sockets Functions
- Input/Output Functions
- Client/Server Programming
- Creating a Server
- Creating a Client

#### **Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 9
- *Developer's Guide* Chapter 5

#### **Lab:**

- Create a Platform and Protocol Independent Network Library

### **Week 10 – Input / Output Operations**

- Community Design
- Detecting Network Events
- Multithreading
- I/O Strategy
- I/O Control
- Broadcasting

#### **Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 10
- *Developer's Guide* Chapter 6

#### **Lab:**

- Create the Login Server

### **Week 11 – Conflict and Competition**

- Conflict in Multiplayer Spaces
- Conflict Scenarios
- Conflict and Cooperation

#### **Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 11

#### **Lab:**

- Create the Login Client

### **Week 12 – Designing with Technical Limitations**

- Design Perspectives
- First Thoughts
- Network Performance
- Network Protocols
- Security

#### **Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 12

#### **Lab:**

- Create the Game Lobby Client

**Week 13 – Release Strategies**

- Understanding Prototyping and Its Meaning
- Introduction to Prototyping Techniques
- Authoring Systems
- Alphas, Betas, and Release Candidates
- The Testing Process

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapters 13-14

**Lab:**

- Create the Game Lobby Server

**Week 14 – Massively Multiplayer Games and Middleware**

- Overview of Game Middleware
- Case Study: Artifact Entertainment's Horizons

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapter 15

**Lab:**

- Create an Online Game

**Week 15 – Industry Paradigms**

- Interactivity and Computer Games
- Meaning of "Multiplayer" for Gamers and Games
- Meaning of "Multiplayer" for Game Designers
- The Future of Multiplayer Online Games
- Understanding of Multiplayer Online Computer Games

**Reading Assignment:**

- *Online Game Interactivity Theory* Chapters 16

**Lab:**

- Final Project

**Week 16 – Final Examination**