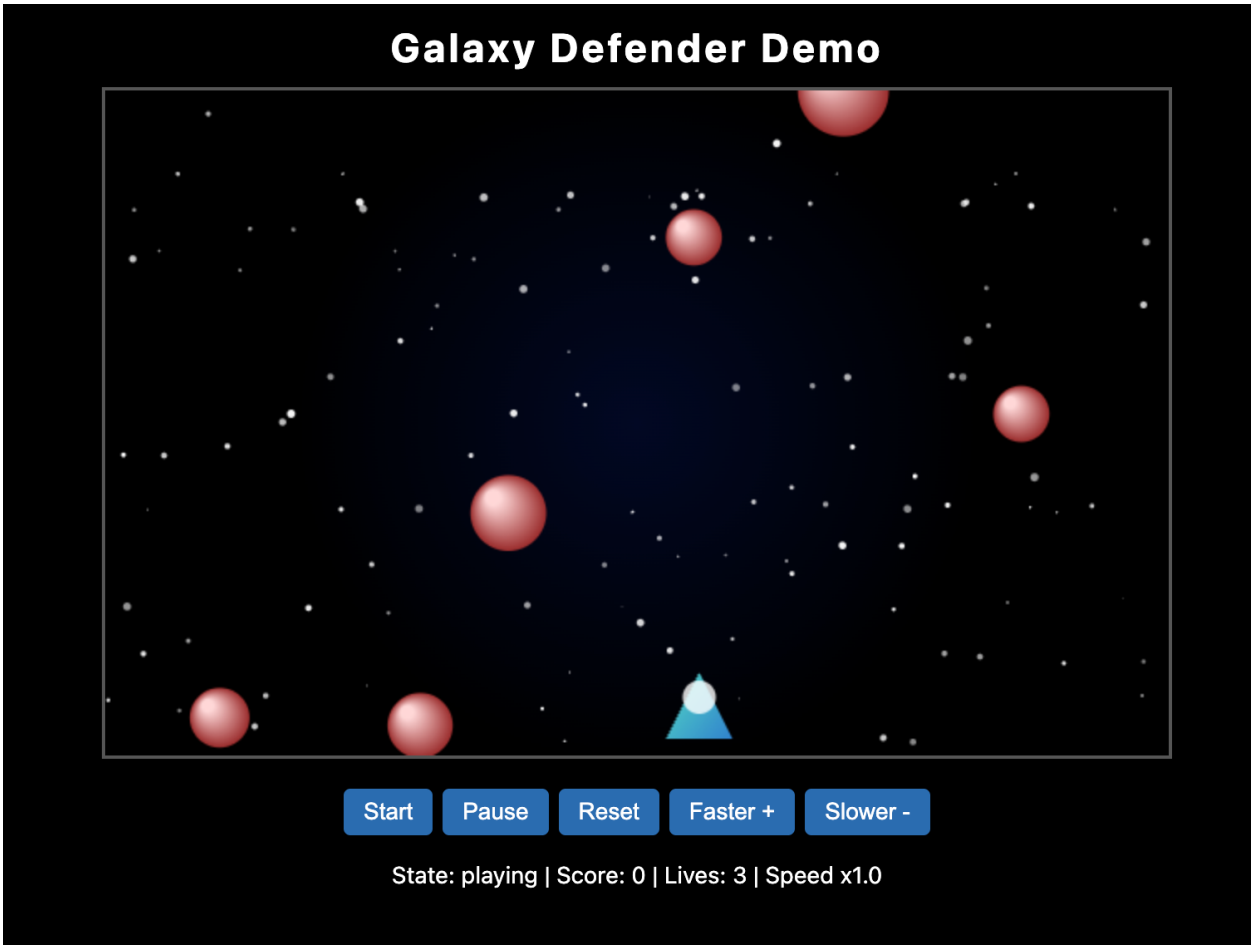
# Web Programming — Midterm Project

# Galaxy Defender Game Development

## Deadline 12/9/2025 11:59pm




In this midterm project, you will create an interactive Galaxy Defender game (or you can design your creative theme) using HTML5 Canvas and JavaScript. You are required to design your own spaceship, meteors, background, animations, and game mechanics (or your theme objects).

This assignment focuses on Canvas rendering, event handling, animation loops, object states, collision detection, and creative UI/UX design.

Project Requirements & Grading

**1. HTML UI Elements (10%)**

Your UI must include:

- A <canvas> element as the main game area
- At least **five control buttons**:
    - **Start**, **Pause**, **Reset**, **Speed +**, **Speed –**
- An information panel displaying:
    - Score, Lives, Speed factor, Current game state

**2. Opening Animation (10%)**

Before the game begins, your program must display a short **opening animation**, such as:

- Text flying in from outside the screen
- Glow effects
- Fade-in / fade-out
- Scaling or color-changing effects
- Animated starfield background

Your animation should include **at least two types** of visual changes (e.g., movement + transparency).

**3. Spaceship (or your theme-related object) (10%)**

- Positioned near the bottom center of the canvas
- Controlled using **keyboard (Left/Right/etc..,)**
- Must have a custom design (shape, drawing, or image).
- Cannot move outside the canvas boundaries
- Has two states: **alive / dead**

**4. Shooting Mechanism (10%)**

The player must be able to shoot:

- Clicking the canvas or pressing a key (e.g., Space) fires bullets
- Bullets move upward
- A bullet destroys a meteor on collision
- Multiple bullets can exist simultaneously (array/object management)

**5. Meteors Generation & Animation (15%)**

Your game must include:

- Random meteor (or theme-related obstacle) generation from the top
- Randomized sizes , colors and positions
- Meteors falling at varying speeds
- Increasing difficulty over time
- At least **two types** of meteor appearances (different shapes/colors)

6. **6. Collision Detection (20%)**

You must detect the following collisions:

**(a) Bullet vs Meteor**

→ Meteor destroyed, score +10

**(b) Meteor vs Spaceship**

→ Lose a life

**(c) Meteor reaches bottom of screen**

→ Lose a life

**(d) Lives reach zero**

**→ Game Over screen**

Collision methods may include:

- Circle–circle
- Circle–rectangle
- Custom bounding boxes

**7. Game State Management (10%)**

Your game must correctly handle the following states:

- **Opening** (opening animation)
- **Ready** (show “Press Start”)
- **Playing**
- **Paused**

- **Game Over**

Correct transitions include:

- Start → Playing
- Pause → Paused / Playing
- Reset → Ready
- Game Over → wait for new Start

**8. Creativity / Design Creativity (10%) — *Most Important Differentiator***

Every student must produce a unique game. Creativity points will be awarded based on:

- Custom background design (starfield, planets, stations…)
- Custom spaceship design (geometry, sprite art, themed designs…)
- Custom meteor / obstacle designs (asteroids, aliens, space debris…)
- Custom sound effects or explosion animations
- Additional new gameplay features (choose any — at least ONE required for full creativity score)

Examples include:

- Dual-shot mode (shoot two bullets at once)
- Power-ups (speed boost, shield, extra life)
- Boss battle mode
- Multi-level difficulty
- Special weapons (laser beam, spread shot, piercing shot)
- Shield / temporary invincibility
- Two-player mode (co-op or versus)
- Any creative mechanic you invent
  → *The goal is to ensure every student's project looks and feels different.*

**9. Code Quality & Documentation (5%)**

- Clear code structure
- Reasonable variable and function names
- Proper indentation
- Useful comments explaining major sections

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## 📦 Final Submission

**Submit a ZIP file containing:**

**1. index.html (main game file)**

**2. Any assets (images/sounds) in an assets/ folder**

**3. A PDF report with:**

- **Screenshots of your game**
- **Short description of features you completed**
- **Explanation of your custom designs (spaceship, background, meteors)**
- **Description of your creative gameplay addition**
- **User instructions (how to move, how to shoot, how to pause/reset)**

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## 🧱 Final Grading (100%)

| Category | Score |
|---|---|
| HTML UI Elements | 10% |
| Opening Animation | 10% |
| Spaceship | 10% |
| Shooting Mechanism | 10% |
| Meteors Generation & Animation | 15% |
| Collision Detection | 20% |
| Game State Management | 10% |
| Code Quality & Documentation | 5% |
| Creativity / Design Creativity | 10% |
| Total | 100% |