

*Engage, Empower, Excite, Educate*

COURSE PLAN

| **Course Information** | ***Enter course information into the cells below.*** |
| --- | --- |
| **Course Title:** | Physics and Simulation 1 |
| **Course Code:** | INFO-6019 |
| **Program:** | GDP1: Game Development – Advanced Programming |
| **School:** | ITY |
| **Term:** | Fall |
| **Prepared by:** | Michael Feeney |

*The Course Plan provides an outline of topics that support the course learning outcomes and essential employability skills. It also provides an overview with respect to the scheduling of topics, required preparation for each topic, and corresponding learning resources and evaluation items. Using the course plan will help you manage your time to get the most from the course and complete the evaluation items on time. Refer to the* [*academic calendar dates*](https://www.fanshawec.ca/admission-finance/important-dates/academic-calendar) *on the Fanshawe College website.*

| Time | Topic | Delivery Details:Evaluation |
| --- | --- | --- |
| Week 1 | Design issues and general concepts:  Geometry, Object representation, Animation, Time, Response, Performance, Robustness |  |
| Week 2 | Discrete math (2D and 3D): Coordinate Systems and points, Vectors, Barycentric Coordinates, Lines, rays, and Segments, Polygon and Polyhedra, Convex Hulls and Voronoi Regions, Matrices, Numerical robustness |  |
| Week 3 | Euler integration |  |
| Week 4 - 6 | Bounding Volumes and Basic Primitive Tests: Spheres,  Axis-Aligned Bounding Boxes, Oriented Bounding Boxes, Sphere-swept Volumes, Polygons, Closest-point computations, Testing Primitives, Intersection Lines, Rays, and Segments, Dynamic Intersection Tests (tunnelling  and swept volumes) | Project #1: due  approx. Week 4 |
| Week 7 |  | Midterm exam  Project #2 due |
| Week 8 | Particle Systems |  |
| Week 9 | Convex Objects: Boundary based, Hierarchical Polyhedron representations, Linear and Quadratic Programming, Proximity Queries, Other techniques (for instance: Gilbert-Johnson-Keerthi, etc.) |  |
| Week 10 – 12 | Spatial data structures and partitioning: Axis Aligned Bounding Boxes (AABBs), Oriented Bounding Boxes (OBBs), Uniform grids, Hierarchical grids, Trees, Sort and Sweep (Broad Phase) methods, Cells and Portals | Project #3 due  approx. Week 10 |
| Week 13 | Other integration techniques: Mid-point integration, Runge–Kutta (RK-4) integration |  |
| Week 14 | Geometric Robustness, Optimization | Project #4 due |
| Exam Week |  | Final Exam |