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| **ELEMENT** | **CONTENT** |
| DEPARTMENT | CIS |
| AUTHOR (S) | Jeremy Ouellette |
| COURSE NUMBER | **CIS 5220** |
| COURSE TITLE | **Advanced Physical Simulations** |
| SHORT TITLE | Adv Phys Sims |
| COURSE LEVEL | 5000 |
| DATE CREATED |  |
| CHECKED/CHANGED | 4/10/2017 |
| PREREQUISITES | CIS 2025 or 2262 or 2271; PHY 1041 |
| COREQUISITES |  |
| RESTRICTIONS | Graduate standing |
| SPECIAL FEES | No |
| CREDITS | 3 |
| HOURS | 3 hours of lecture per week |
| SEMESTER | As required |
| COURSE DESCRIPTION | This course combines numerical programming techniques with Newtonian physics and calculus to give the student an understanding of how physical systems can be simulated on a computer. Topics include the simulation of rigid bodies, soft bodies, fluids, and collision detection. This course emphasizes applications rather than mathematical theory and entails a significant amount of programming. |
| SUGGESTED TEXTS |  |
| OPTIONAL TEXTS |  |
| COURSE OUTCOMES | The successful student will be able to:   1. Develop data structures to represent appropriate aspects of the physical world 2. Implement computer calculations to model the Newtonian world 3. Complete an advanced project |
| COURSE CONTENT | 1. Review of Newtonian physics 2. Numerical methods 3. Simulating point masses 4. Data structures for physical representations 5. Simulating rigid bodies 6. Simulating soft bodies 7. Collision detection 8. Simulating fluids 9. Tuning simulations 10. Optional topics as time permits |
| LAB/STUDIO OUTCOMES |  |
| LAB/STUDIO CONTENT |  |
| LECTURE CAPACITY | 32 |
| LAB CAPACITY |  |
| GRADED OR P/NP | Graded |
| EVALUATION | Homework, quizzes, exams, projects |
| DELIVERY METHOD | LEC |
| ROOM REQUIREMENTS |  |
| AUTHOR’S NOTES | Undergraduate-level cross-listed course is CIS 4220. |