R • I • T

Rochester Institute of Technology

School of Interactive Games and Media

152 Lomb Memorial Drive

Rochester, NY 14623

## IGME 740: Game Graphics Programming

## Spring 2018-2019 Course Syllabus

## Instructor Information

**Professor Name:** Chris Cascioli

**Email Address:** [cdccis@rit.edu](mailto:cdccis@rit.edu)

**Office Location:** Golisano Hall 2511 (2nd floor)

**Office Hours:** MW: 1 - 2pm

TR: 2 - 3pm

Also available by appointment

## Course Information

**Course Number:** IGME 740

**Course Name:** Game Graphics Programming

**Credits:** 3 credits

**Meeting Place/Time:** Orange Hall 1370 – TR 3:30pm – 4:45pm

## Course Description

Students will explore the use of an advanced graphics API to access hardware-accelerated graphics in a real-time graphics engine context. The course will involve discussion of scene graphs, optimizations, and integration with the API object structure, as well as input schemes, content pipelines, and 2D and 3D rendering techniques. Students will also explore the advanced use of the API calls in production code to construct environments capable of real-time performance. Students will construct from scratch a fully functional graphics engine, with library construction for game development. Advanced topics will be explored, including real-time special effects, custom shading pipelines, and advanced deferred rendering techniques.

## Important RIT Deadlines

* Last day of add/drop is ***January 22.***
* The last day to withdraw with a grade of **W** is ***April 5*.**
* IGM School policy states that students have one semester to challenge any grade. After that, grades cannot be challenged.

## Texts and Materials

**Required Texts**

* **None**

**Computer & Programming Requirements:**

* **Visual Studio 2017** – Available free on DreamSpark or VisualStudio.com

**MyCourses**

An important component of this course is the MyCourses course shell. The course shell contains vital information such as readings, weekly assignments, code templates, supplemental materials, course notes, and other useful items. In addition, MyCourses contains a dropbox system that allows students to upload their assignments and code projects. It is your responsibility to log into MyCourses on a regular basis to check for additional materials and assignments.

## Course Prerequisites

**Prerequisite Courses**

* IGME-601 Game Development Processes
* IGME-603 Gameplay and Prototyping

**Prerequisite Skills**

* Familiarity with C++ and Visual Studio
  + This course requires the use of, but does not directly teach, C++
  + If you are not comfortable with C++ this is not the course for you
* Familiarity with 2D & 3D math concepts such as vectors, matrices and quaternions.

## Course Organization

**Class Participation / Attendance [10%]**

You are expected to attend class and ask questions about any and all graphics-related topics. This is going to be a new area for many of you, and it requires a different way of thinking about your code and how you interface with the hardware in your PC.

You are also encouraged to suggest specific techniques and graphic effects for me to cover. If you can send me a link to a video of a game or effect, we’ll look at it in class and discuss ways of implementing it.

**Quizzes [20%]**

Most major topics will have an associated, in-class quiz. These quizzes will draw from assignments, topic slides and lectures given in class.

You may use any hand-written notes you like for the quizzes, but not lecture slides or the internet.

**Individual Graphics Programming Assignments [25%]**

The course begins with several individual programming assignments. These assignments will be completed outside of class, and will allow you to get comfortable using DirectX 11 by creating a basic graphics engine. You may (and should) use the code you write for the individual assignments as a basis for the group project later in the course.

Late assignments lose 20% per day late.

**Group Game Project [45%]**

You will be creating a from-scratch game-like experience and engine with a group of students, using C++ and DirectX 11. Your game experience should be *extremely* simple. The goal of this project is to gain experience with graphics programming in a game context, not flex your design muscles. You’re going to focus on the engine, the rendering pipeline and on using many of today’s common real-time rendering techniques in a game.

Because this is a topic that will probably require a lot of debugging and trial & error, I encourage you to choose an existing, simple game and implement it. Your job is to learn about shaders & the rendering pipeline, and use them to create some sweet visuals in a game context.

Keep it basic: A single core mechanic, a feasible art style and not a lot of gameplay-related bells and whistles (no advanced physics, crazy AI, networking, etc.) Think of it as a very pretty game prototype.

**You’re going to:**

* Make a game with a group of students
* Use C++ and DirectX 11
* Create external tools and/or in-game debugging options where necessary

**Specific game design requirements:**

* The game should either:
  + Be based on a simple existing game (think existing Web or Mobile games)
  + Revolve around a single, simple and fun core mechanic
* The game should contain features that can be enhanced by the types of graphical effects and rendering techniques we’ll be covering this semester
* The game must have an early playable prototype (Ideally in Unity – more on this later)
* The game must have 1 playable “level”

**Specific technology requirements:**

* The game must have 2D and 3D content (as in 3D models, not 3D glasses)
* The game must have basic menus and/or other game states as necessary

**Your Game Should:**

* Not be overly complex (scope it down!)
* Use a simple, appropriate and **feasible** art style (and look good)
* Make a great portfolio piece

**Project Milestones:**

There will be approximately 4 milestones throughout the semester to ensure each group is making appropriate progress.

Each milestone will also require peer evaluations, which can impact your overall course grade. The last milestone is when the final version of your game is due. Detailed information about each milestone will be given in advance of each due date.

The milestones dates, once set, are not flexible. Submit your game in whatever state it’s in on the due date.

**Final Presentation:**

You will present your game to the rest of the class (and anyone else who wants to attend) during finals week.

**This Project & Capstone:**

Keep the following in mind: This is a course about graphics programming in a game context, not “Grad Capstone Part 1”. A core mechanic, feasible art style and a realistic scope are all very good places to start (and end). That being said, some groups in the past have used this project as a dry-run for Capstone: working together to create a working game from scratch. That’s fine, too, but keep scope and time in mind when deciding what you’ll be creating!

## Course Evaluation

|  |  |  |
| --- | --- | --- |
| Points | Letter Grade | Grade Points |
| >= 90.0 | A | 4.00 |
| >= 80.0 & < 90.0 | B | 3.00 |
| >= 70.0 & < 80.0 | C | 2.00 |
| < 70.0 | F | 0.00 |

## Out-of-Class Resources

**Tutoring Hours:** The School of Interactive Games and Media employs a number of graduate students as tutors. Their schedules are posted on all IGM lab doors and their lab hours are held in the open labs during open hours (Golisano Hall 2000, Golisano Hall 2025, and Golisano Hall 2550). Even though tutors are spread between both the New Media and Game Design and Development facilities, students are not limited to a particular lab. Each tutor has specific expertise, but should be able to answer general questions for all undergraduate courses.

**Office Hours:** I have 4 hours of office hours per week. Office hour information is posted at the top of this syllabus. Please make sure that if you need to use office hours, you show up in a timely manner and you come prepared to present your problem to your instructor. Sometimes, faculty choose to hold their office hours in the lab or at an alternative location. If the location differs from the office hour location on this syllabus, the faculty will post the alternative location on his or her door.

**Advisors:** In the event that you have general questions about this course, and you feel you want to talk to someone outside of the instructor, you can always make an appointment with a faculty or professional advisor to discuss issues.

**Other Channels for Help:** It is important to realize that there are number of general help avenues available on campus. The RIT Academic Support Center has a number of resources for students in terms of assistance with math, science, and writing skills. More information can be found here: <http://www.rit.edu/studentaffairs/asc>

## Accommodations

Any student requiring academic accommodation due to a disability must submit a request for accommodation with the Institute. A valid accommodation form must be submitted to the instructor during the first week of the class. It is the student’s responsibility to work with the instructor to ensure that accommodation requirements are met. For more information on disability services and accommodations, please contact the Disability Services Office at <http://www.rit.edu/dso>.

## Rules and Additional Information

**Late Policy:** If you are having problems with an assignment or have an emergency that may make you late in submitting your work, **contact me before the due date**. Excuses made after the fact are not super effective.

**Missing Quizzes:** There are no make-ups for quizzes if you don’t have a valid, documented reason. “I overslept” or “I wasn’t feeling good” isn’t a valid reason. If you anticipate missing a quiz, contact me beforehand and we can potentially arrange an alternative time to take it.

**Incomplete Policy:** Incomplete (“I”) grades are reserved for cases in which the student is making credible course progress, and then something occurs in the student’s life that prevents the completion of the course. Incomplete grades are not a mechanism to delay a failing grade nor are they a means to stave off probation or a suspension. In order for an instructor to grant an incomplete, credible documentation must be provided at the instructor’s or school’s request.

**Challenging Grades:** If you challenge a grade, it must be done in a timely manner, within a week of the return of an assignment. Remember that in challenging a grade, the instructor reserves the right to revisit the grading on the entire assignment and may adjust the grade appropriately. This is mentioned not to discourage a student with a legitimate complaint over a grade, but to rather address the often blatant problem of “point weaseling” on assignments.

**Classroom Etiquette:** Due to time constraints, it is important that you arrive at class each day prepared to work. For classes that require computing equipment, be sure to log in and have your software ready at the beginning of each class. If you are late to class, please try to enter the classroom with minimal disruption. Make sure that devices such as cell phones, MP3 players, and other disruptive devices are turned off or silenced. Don’t answer phone calls during class.

The computers are for following along with the lecture and doing work. I know we all love games, but don’t play games during class. Don’t surf Facebook or reddit during class either. It’s rude, not to mention disrespectful and distracting to other students.

Don’t sleep in class. Sleeping in class is just as bad as missing class. If you are truly too tired to function, stay home that day (or become best friends with coffee).

**Missing Class:** In the case of an illness or unexpected absence, the student should try to communicate with the faculty in as timely of a manner as possible. When class is missed, it is up to the student to make up work and to acquire any course materials. Absences in any form do not postpone due dates unless agreed upon by the instructor.

**Class Cancellation:** In the event that the faculty cannot attend a class session, students will be contacted via email and cancellation signs will be placed on classroom doors. Explicit instructions for a cancellation will be communicated via your RIT e-mail.

**E-Mail Address:** All official communications should occur between your RIT e-mail address and the faculty’s RIT e-mail address. Please check your RIT e-mail on a daily basis for important notifications. Furthermore, faculty may not be able to respond to requests that do not originate from an RIT e-mail.

**E-Mail Assistance:** If you have a question or two about a topic or assignment, please email me about it. If you have a *small* section of code giving you issues, copy and paste it into an email.

Do **NOT** email me your entire project and ask if I can fix it for you. If you are having a hard time with an assignment, come to my office hours (that’s why I have them!) or see one of the tutors. It’s much easier to discuss assignments and broken code in person.

Always include a subject line, and be sure to mention the class name and section. It’s also expected that you use complete sentences and punctuation, as well as sign your name.

**What Do You Call Your Professor?** Different professors prefer different ways of being addressed. Many will be offended if you use their first name. I’m ok with just “Chris”. Nothing fancier required.

**Social Networks**: I don’t generally friend students on Facebook while I have them in a class. After that, I only friend students I know really well (who are also awesome). I’m always more than happy to connect via LinkedIn, however.

## Finally…

All information in this syllabus is subject to change. Should anything change, I will let you know in class, on MyCourses and/or via email.

## Academic Integrity

Please review these policies on academic integrity:

* RIT’s policy: <http://www.rit.edu/academicaffairs/policiesmanual/d080>

The Department of Interactive Games and Media does not condone any form of academic dishonesty. Any act of improperly representing another person’s work as one’s own (or allowing someone else to represent your work as their own) is construed as an act of aca­demic dishonesty. These acts include, but are not limited to, plagiarism in any form or use of information and materials not authorized by the instructor during an examination or for any assignment.

**If a faculty member judges a student to be guilty of any form of academic dishonesty, the student will receive a** **failing grade for the course**. Academic dishonesty involving the abuse of RIT computing facilities may result in the pursuit of more severe action.

If the student believes the action by the instructor to be incorrect or the penalty too severe, the faculty member will arrange to meet jointly with the student and with the faculty member’s immediate supervisor. If the matter cannot be resolved at this level, an appeal may be made to the GCCIS Academic Conduct Committee.

If the faculty member or the faculty member’s immediate supervisor feels that the alleged misconduct warrants more severe action than failure in the course, the case may be referred to the GCCIS Academic Conduct Committee. The Academic Conduct Committee can recommend further action to the dean of the student’s college including academic suspension or dismissal from the Institute.

The following definitions will be used to clarify and explain unacceptable conduct. This is not intended to be an exhaustive list of specific actions but a reasonable description to guide one’s actions.

**CHEATING includes knowingly using, buying, stealing,** transporting or soliciting **in whole or part the contents of an** administered/unadministered test, test key, homework solution, paper, **project,** **software project or computer program**, or any other assignment. **It also includes using, accessing, altering, or gaining entry to information held in a computer account or disk owned by another.**

**COLLUSION means the unauthorized collaboration with another person** in preparing written work or computer work (including electronic media) offered for credit. Final work submitted by a student must be substantially the work of that student. **Collaboration on an assignment is expressly forbidden unless it is explicitly designated as a group project.** When there is any doubt, a student should consult the instructor (NOT ANOTHER STUDENT) as to whether some action is considered collusion.

Whenever there is any question as to whether a particular action is considered academic dishonesty, the instructor should be consulted.

## Gender Discrimination

RIT is committed to providing a safe learning environment, free of harassment and discrimination as articulated in our university policies located on our governance website. RIT’s policies require faculty to share information about incidents of gender based discrimination and harassment with RIT’s Title IX coordinator or deputy coordinators, regardless whether the incidents are stated to them in person or shared by students as part of their coursework.

If you have a concern related to gender-based discrimination and/or harassment and prefer to have a confidential discussion, assistance is available from one of RIT’s confidential resources on campus (listed below).

1. The Center for Women & Gender: Campus Center Room 1760; 585-475-7464

2. CARES (available 24 hours/7 days a week) Call or text 585-295-3533.

3. RIT Student Health Center – August Health Center/1st floor; 585-475-2255.

4. RIT Counseling Center - August Health Center /2nd floor - 2100; 585-475-2261.

5. The Ombuds Office – Student Auxiliary Union/Room 1114; 585-475-7200 or 585-475-2876.

6. The Center for Religious Life – Schmitt Interfaith Center/Rm1400; 585-475-2137.

7. NTID Counseling & Academic Advising Services – 2nd Floor Lynden B. Johnson; 585-475-6468 (v), 585-286-4070 (vp).

## RIT ADA Statement

RIT is committed to providing reasonable accommodations to students with disabilities. If you would like to request accommodations such as special seating or testing modifications due to a disability, please contact the Disability Services Office. It is located in the Student Alumni Union, Room 1150; the Web site is <http://www.rit.edu/dso>. After you receive accommodation approval, it is imperative that you speak with the instructor so that you can work out whatever arrangement is necessary.