

COSC 3P98 – Introduction to Computer Graphics

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Office hours: TBA (or when door open)

TAs: TBA

Lectures: Tuesday and Friday 11:30-1pm, STH217 (AS 217)

Course web site: <http://www.cosc.brocku.ca/Offerings/3P98/>

Objective: This is an introductory course in computer graphics. The essential course requirements are:

1. Fundamental knowledge of computer graphics: theory, terminology, concepts, principles, technologies.
2. Practical knowledge and skills: This primarily involves graphics programming using OpenGL/GLUT. This is assessed in the assignments and final exam.

The course project permits further study and assessment in fundamental principles and/or practical knowledge.

Texts (recommended only)

- *Computer Graphics with OpenGL (4e)*, D. Hearn, M.P. Baker. Prentice Hall, 2004. ISBN 0130153907
- *OpenGL: A Primer (3e)*, Edward Angel, Addison-Wesley, 2007. ISBN 0321398114.
- *OpenGL Programming Guide v2.1 (6e)*, OpenGL ARB, Addison-Wesley, 2007. ISBN 0321481003.
- *The C Programming Language (2e)*, by Brian W Kernighan and Dennis M Ritchie. Prentice Hall, 1989. ISBN 0131103628.

Other texts (Hill, Angel, and others) are also useful. Ones that use OpenGL and GLUT are recommended for programming help. A free textbook that may be useful is by David J. Eck:
<https://open.umn.edu/opentextbooks/textbooks/420>

Reserve reading: See Library web site.

Outline: Topics to be studied may include:

- OpenGL
- 2D raster algorithms
- GUI programming
- Computational geometry
- 2D and 3D transformations
- Texture
- 3D perspective
- Visible surface determination
- Illuminated surfaces and lighting
- Ray tracing

Autumn 2023

- Animation
- ???

- Fractals

Evaluation	Assignments (3):	40%
	Final exam:	35%
	Project:	25%

A grade of 40% must be obtained on the final exam to pass the course.

Important dates (see the [Registrar's web site](#) for official dates, including snow days, etc.)

Date when 15% of final grade will be reported:	October 31, 2023
Date for withdrawal without academic penalty:	November 7, 2023

Comments:

- Important course news will be sent via the course email list.
- MS Teams is NOT used for communications. (I do not log into Teams regularly).

Relationship between attendance and grades

As all senior-level students know, attendance at lectures correlates with a good grade in the course. If you miss a lecture, you are expected to get notes from another student. If you miss lots of lectures, you should seriously consider withdrawing from the course. Neither the professor or TA will give makeup tutorials for missed lectures, neither in person, MS Teams, or via email.

Assignments

1. Assignments will use C, OpenGL, Glut and FreeImage. All submissions must be precompiled and immediately executable by the TA in our labs. The TA will **not** compile submissions, and will not port code to work in our lab environment. C++ is permitted, although it will not be used in lectures. Windows 10 is the supported OS. Linux is also permitted, so long as work is pre-compiled and executable in our labs. Before you submit your assignment, **be sure** that you have compiled and executed the assignment in our labs. This means that you should avoid using libraries not executable in our own labs. In the past, students have worked on assignments in Mac OS, and this is acceptable so long you port to Windows prior to submission. Note that the use of system-dependent libraries may prevent that from happening. Assignments that are not precompiled and executable by the TA will not be graded.

2. If you are using your own computer, you can use the Visual Studio Community edition for C programming:

- <https://visualstudio.microsoft.com/vs/community/>

3. At the start of term, the TA will give a short tutorial on compiling and running OpenGL and Glut in Visual Studio on Windows 10.

4. There are no extensions for assignments. Late assignments are not accepted. Assignments are due on the specified date/time on the handout. You should start your

assignment well in advance to avoid problems. Most assignments will give 3 to 4 weeks for completion.

5. In order for an assignment or project to be marked, it must be submitted on the Brightspace site for the course. A signed department cover page must be included.

6. Assignments submitted by email will not be marked.

7. Assignments often include bonus marks. However, the total 40% mark allocation for assignments cannot be exceeded by adding bonus marks. In other words, 40% is the maximum total assignment mark possible, and excess marks above 40% are discarded.

Course project

1. Projects can be a term paper, graphics application (e.g. game, interactive fractal explorer,...), ray tracer, or computer animation. You can work in groups of up to 2 people for the ray tracer, games, and animations (and possibly other applications, depending on the topic). Essays are done individually. See the project handout for details.

2. Essays will be due in December (date TBA). All essays will be processed by Turnitin.

3. Application, ray tracing and animation projects will be due in early January (date TBA).

4. You are encouraged to finish your project before the deadline. The essay project can be done faster than an application or animation.

5. Projects must also be handed in with a cover page, and submitted to Sakai. Email submission is not permitted.

6. I may request a demonstration of your project.

7. Note that you should work on a project that is substantially different from other course work you have done before. You will get the most out of this course if you learn new systems. This is an opportunity to expand your resume! Do not tweak a project from another course and submit it (that is academic misconduct, by the way). In particular:

- Game programming students cannot use systems that are part of their game courses (Unity 3D, 3DS Max, others) for their 3P98 project.
- Students who have taken COSC/STAC/VISA 2P96 are not permitted to use Autodesk Maya for their animation project.

Plagiarism

Academic misconduct is a serious offence. Students should be familiar with department and university policies on academic misconduct:

<https://brocku.ca/webcal/2022/undergrad/areg.html#sec67>

<https://brocku.ca/mathematics-science/computer-science/academic-integrity/>

The department views plagiarism seriously, and has zero tolerance for it. Since this is an upper-year course, **plagiarism will result in maximum penalties**. Examples of penalties given in the past include:

- Assignments penalties result in a minimum of -30% in final grade (in other words, the value of at least 2 assignments)
- Project penalties result in a minimum of at least -50% in final grade (automatic fail)

- Exam penalties result in 0F in the course and recommendation for suspension from the university.
- Second or higher offences, as well as contract plagiarism or ChatGPT or similar system use, result in 0F in the course, and recommendation for suspension from university
- Extreme cases have included a ban from taking any computer science course in the future (requires change of major, and forfeiting of previous credits).

The use of contract plagiarism for assignments and projects will not be tolerated, and will result in appropriately harsh outcomes. This includes submitting content shared by another student who paid for the contract. Also beware of extortion - it can haunt a student for years after graduation, and be very expensive.

The use of ChatGPT and other AI LLM's is not permitted for any assignments or projects (essay, systems programming). The submission of course work that has been processed or generated by such systems is considered academic misconduct, and will result in severe penalties. You want to be smarter than ChatGPT when you graduate, so don't use it.

Turnitin will be used on all essay project submissions. The Moss plagiarism system (or equivalent) will be used on assignments and projects.

If you work in a group in a project, all group members must contribute equally to the coding or system creation. **All group members are responsible for understanding all aspects of the submission.** In other words, you need to understand all the code, including code you didn't write. If any portion of a submission is found to violate academic integrity principles, then **all team members will be held fully accountable and penalized.** You should work with those with whom you know and trust!

Open source code and course work

The open-source philosophy is wonderful, and has resulted in many fantastic software developments. However, you are **not permitted to use it** in your course work. The purpose of assignments and projects is to evaluate **your own** abilities, ideas, and programming skills. A recurring problem, however, is that assignments and projects have been submitted in which a substantial portion of code (sometimes all of it) is not written by the student. Although the source of such code might be cited, and therefore is not plagiarism, it is often the case that students have no understanding of how the code works, and have used it as a short cut instead of doing their own work.

The course policy on software libraries and open-source code is as follows:

- If the code reflects a non-essential aspect of the application (e.g. file I/O, data structure library, or some utility function that supports the application, but is not central to the assignment or project focus) then it might be acceptable. Please **confirm with me** whether it is acceptable to use.
- If authorized, a full citation to the source of the code must be included in inline comments in the program, as well as any supporting documentation. The start and end of the borrowed code must be clearly delimited with comments.
- If the code is an essential feature, then it **should not be used.** The extent of use of such code will be assessed, and a mark will be assigned accordingly.
- If the sources of libraries or open-source code are not fully acknowledged, then academic misconduct will arise.

- The above applies both to directly copied open-source code, as well as copied code that has been edited and modified.

Some examples of acceptable use of code/libraries (all suitably cited):

- Using an image I/O library for reading/writing JPEG-compressed image files (presuming that JPEG compression is not the focus of the project).
- Using a library for reading/writing a 3D file (eg. Collada).
- Using a library to implement dynamic data structures such as lists.
- Using an audio library for supporting a 3D game.
- Using an XML I/O library for a ray tracer scene input file.

Some unacceptable examples:

- Core aspects of the OpenGL/GLUT game engine are implemented with open-source code.
- A fractal rendering program has a number of mathematical expressions and rendering options copied/modified from open-source fractal implementations.
- Open-source code for a 2D triangulation algorithm is used to partially or fully implement 2D triangulation for an assignment. The algorithm may or may not be one discussed in class.
- Ray tracing intersection code for different mathematical shapes is taken from open-source ray tracers, or some other source (textbook,...).
- A submitted animation is essentially a tutorial example from a book or online tutorial.
- A 3D model is copied from another source, but not attributed as such.
- Code is originally generated or modified by ChatGPT or related LLM system.

If you have any questions about using libraries or open-source code, **please ask me**.

Medical and Special Accommodation

Please be aware of the university's policy on medical accommodations:

<https://brocku.ca/webcal/2023/undergrad/areg.html - sec52>

In particular:

- All medical accommodations must include an official Brock medical form: <https://brocku.ca/registrar/toolkit/forms/#medical-certificate>
- It is an instructor's discretion to accept a note or not. You must adhere to the rules on the note. Requests not complying with the rules will not be accepted. False statements on a submitted form will result in academic misconduct charges.
- Medical notes should be submitted to the main office. You must contact me immediately to discuss details of the accommodations. If you wait too long before talking to me, then accommodation may be denied.
- The submission of photographs of medical conditions or prescriptions is completely inappropriate and unacceptable.
- **Medical accommodation does not apply to group assignments or projects.**
- Since all notes are tracked by the department, patterns showing misuse of notes will be flagged, and this will affect acceptance of future requests. For example, a pattern of medical note submissions repeatedly coinciding with assignment deadlines, in one or more courses, will raise red flags.
- Approved exam deferrals will involve writing a different exam than the rest of the class.

- **Please do not abuse medical accommodations!**

Students registered with Student Accessibility Services (SAS) must comply to the established conditions of their registration. **Please contact me within the first 2 weeks of the term to discuss accommodations in this course.**

If you require academic accommodation on religious grounds, you should make a formal, written request to me during the first two weeks of the term, and as soon as possible after a need for accommodation is known to exist (for example, when an assignment is handed out).

The following are examples of unacceptable reasons to request accommodations (I've heard most of these!) :

- Illness of a family member, relative, friend, roommate, pet, celebrity.
- Attendance at a wedding, honeymoon, funeral, birthday, Marvel movie premiere.
- Dog chewed your hard drive and/or graphics card.
- Malfunctioning alarm clock.
- Late night at the Falls Casino.
- Vacation. Late bus. Flat tire. Hard disk crash. Aliens.
- etc.

General comments

This course has a well-deserved reputation for having more work than most half-credit courses. You will need to work hard to get a good grade in this course: the assignments are challenging, the exam requires familiarity with the lecture material and assignments, and the project requires independent research. It is wise to place a lot of effort in understanding the lecture material, as it will aid your understanding of computer graphics in general, and help you with your programming and final exam. **(Skip lectures at your peril!)** Your success will depend on your dedication to doing the work. Start your assignments as soon as possible. Do not leave your assignment until the weekend before the due date. Once again, **extensions do not happen in this course.** An early start on the project is also recommended. Essays can be completed faster.

***** Have fun! Be creative! Enjoy computer graphics! *****