

CSE 471: Media Processing and Multimedia

Fall Semester 2021

Course Information

This course will study the use of media in computer applications. Students will study basic signal and image processing and the manipulation of audio, images, and video content. We will learn how to acquire, process, and organize multimedia information. We will also explore the use of a modern multimedia API. A quick introduction to interactive 2D gaming and C# will be included in the course. The programming assignments will include the use of tools and packages and creating your own programs to access and process multimedia data. The focus of this class will be on development tools, not authoring tools such as Director or Flash.

Objective: Students completing this course are expected to be able to:

- Understand the basic mathematics of signal and image manipulation.
- Capture, store, process, and present multimedia data.
- Understand typical media software tools.
- Understand the use of a multimedia API

Instructor: Yiying Tong
Office: 1140 Engineering Building
Office Hours (On Zoom): Monday 2:00-3:30 pm and by appointment.
link: <https://msu.zoom.us/j/95809935333> passcode: 112358
Phone: 355-2359
Feel free to contact me at any time: ytong@msu.edu

TA: Ali Saffary, saffarym@msu.edu
Office Hours (In-person at Bones Lab EB3203):
Tuesday 12:30-2:00 pm and by appointment.

Schedule: Mon/Wed 10:20 -11:40 am Wonders Hall C215 (facial mask required per MSU policy)
Class Zoom link: <https://msu.zoom.us/j/93792185180> passcode: 112358 MSU login.

Textbooks: No required text

Special Materials: You will need a small set of headphones in the lab or speakers at home.

During this course, you will commonly work with media data files, which can be very large and consume your quota. Consider utilizing flash drives for offloading what you don't need to keep online. Be sure to back up!

Prerequisites: (CSE 320 or CSE 331 or CSE 335) and (MTH 314 or ECE 280).

WWW: Information about the class will be posted at:
<http://www.cse.msu.edu/~cse471/>

Class Discussions: Discussions and Questions/Answers can be posted at:
<https://piazza.com/class/ksrjg0omfqbluj>

D2L: This class will be utilizing D2L, the online course management system. These are in addition to the regular class website, which I will also use. Go to <http://d2l.msu.edu>

- Privacy:** Electronic conversation via email, bulletin boards, or any of the D2L features is different from verbal communication because it retains the participant's identity. In this course, all participants will have access to a list of names and email addresses of other course participants. In addition, participants in the course will be able to send bulk emails to all other participants.
- Exams:** This course will include an in-class examination on Wednesday, Nov 17, 2021, 10:20-11:40 am.
- Notice: The class will NOT have a written final exam. We will meet on the scheduled final exam time for the project presentation: Fri, Dec 17, 2021, 7:45 - 9:45 am.
- Quizzes:** Many class sessions will include a short quiz on D2L. This assignment will be completed during the lecture period. Notice: quizzes are to be done ONLY in class and cannot be made up! If you miss class, you miss it. The three lowest-score quizzes are discarded in the grading process. This policy is provided to allow for some missing classes. If you must miss more than three classes for university excused absences, quizzes beyond the first three can be made up.
- Step Assignments:** Many weeks, a smaller programming assignment must be completed during that week. Some step assignments will include questions that must be answered as well as programming assignment steps. Seven steps are planned (the first will not be graded).
- Projects:** 2 projects will be assigned during the semester. These assignments will be individually graded, and some project work may be reflected in step assignment grades. Step assignments are synchronized to the projects. One project will be group projects: Project 1 is for teams with up to 4 students.
- Grading:** There will be these grading elements in this course:
- | | |
|-----------------------|-----|
| In-class examination: | 25% |
| Step assignments: | 36% |
| Project 1: | 14% |
| Project 2: | 10% |
| Quizzes: | 15% |
- Final grades will be based on the scale:
- | | |
|-----|------|
| 4.0 | 90%+ |
| 3.5 | 85% |
| 3.0 | 80% |
| 2.5 | 75% |
| 2.0 | 70% |
| 1.5 | 65% |
| 1.0 | 60% |
- Attendance:** You are expected to attend all class sessions. Failure to participate in a class may be reflected in your quiz scores.
- Extra credit:** There may be limited opportunities for extra credit. I do also make alternative incentives available for exceptional performance and competitive success. I also have, on occasion, assigned optional *loss abatement* questions.

Academic Honesty: Article 2.3.3 of the Academic Freedom Report states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the College of Engineering adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide and/or the MSU Web site: www.msu.edu.) Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests, and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit the course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the <http://www.allmsu.com> website to complete any course work in CSE 471. Students who violate MSU rules may receive a penalty grade, including--but not limited to--a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your coursework. (See also <http://www.msu.edu/unit/ombud/honestylinks.html>)

That's the university policy. My specific policies are as follows: You may discuss individual assignments with other students, but the assignment must be entirely your own work. Plagiarism makes me mad! All work turned in must be your own. If you borrow or adapt software from a textbook or obviously public source code, you must treat this as a quotation or paraphrase, acknowledging the source in the heading or the program module.

You may discuss assignments in general terms with your classmates, the course staff, or the instructor. Still, you are not permitted to receive solutions from others or to read or copy part or all of another person's solution to a problem.

Disabilities: Students with disabilities should contact the Resource Center for Persons with Disabilities to establish reasonable accommodations. For an appointment with a disability specialist, call 353-9642 (voice), 355-1293 (TTY), or visit MyProfile.rcpd.msu.edu.

Commercialization: Commercialization of lecture notes and university-provided course materials is not permitted in this course.

Religious Holidays: You may make up coursework missed to observe a religious holiday only if you make arrangements in advance with the instructor.

Required Activities: To make up course work missed to participate in a required activity for another course or a university-sanctioned event, you must provide the instructor with adequate advanced notice and written authorization from the faculty member of the other course or a university administrator.

Attendance: Students whose names do not appear on the official class list for this course may not attend this class.

Internet: Some professional journals will not consider submission for publication if the article has appeared on the Internet. Please notify your instructor in writing if you do not want your course papers posted on the course Website.

Disruptive Behavior: Article 2.3.5 of the Academic Freedom Report (AFR) for students at Michigan State University states that "The student's behavior in the classroom shall be conducive to the teaching and learning process for all concerned." Article 2.3.10 of the AFR states that "The student has a right to scholarly relationships with faculty based on mutual trust and civility." General Student Regulation 5.02 states that "no student shall . . . interfere with the functions and services of the university (for example, but not limited to, classes . . .) such that the function or service is obstructed or disrupted. Students whose conduct

adversely affects the learning environment in this classroom may be subject to disciplinary action through the Student-Faculty Judiciary process.

Chegg and Similar Sites Policy:

This course has adopted the Chegg and Similar Sites policy. Submission of student work (e.g. assignments and/or exam solutions) based on those found on Chegg, Brainly, Quizlet, and other similar websites will result in an Academic Dishonesty Report (ADR) and an automatic failing grade of zero (0.0) for the course. The ADR for students personally posting questions from assignments or exams to these sites will request additional sanctions.

Course Content (in very approximate order of presentation)

- Introduction to Multimedia.
- Introduction to programming with Visual Studio and MFC.
- Media and data streams.
- Sound and audio.
- Digital sampling and representation of signals.
- Aliasing and antialiasing.
- Feedforward filters.
- Feedback filters.
- Music fundamentals and synthesis.
- Speech recognition and synthesis.
- Digital representation of images.
- Image manipulations.
- Image filtering.
- Image segmentation.
- Augmented imagery.
- Video.
- Animation and time.
- Synchronization.
- Media compression.
- Content analysis and multimedia databases.
- Multimedia storage.
- Games and game design.
- DirectX and C#.

Notice: I never specify exactly what material will be covered on any particular week and reserve the right to modify the presentation order of materials. Likewise, I do not specify in advance the dates of projects and assignments. This is for your benefit. Course progress will be based on feedback from students, be it through grades or directly. However, we must cover the course materials, so if we slow in one area, we must accelerate elsewhere.

The course schedule is subject to change with appropriate notice. Dates for all assignments will be indicated on the class website.