Julie Dorsey

Julie Dorsey is the Frederick W. Beinecke Professor of Computer Science at Yale University, where she teaches computer graphics. She came to Yale in 2002 from MIT, where she held tenured appointments in both the Department of Electrical Engineering and Computer Science (EECS) and the School of Architecture. She received undergraduate degrees in architecture and graduate degrees in computer science from Cornell University.

Theodore Kim

Theodore Kim is a Professor of Computer Science at Yale University. He researches topics in physics-based animation, which include the simulation of fire, water, muscles, skin, and virtual humans. He joined Yale from Pixar Animation Studios in 2019, and received Scientific and Technical Academy Awards in both 2012 and 2022. He holds a PhD and MS from UNC Chapel Hill, and a BS from Cornell University.

Holly Rushmeier

Holly Rushmeier is the John C. Malone Professor of Computer Science at Yale University. Her research interests include shape and appearance capture, applications of perception in computer graphics, modeling material appearance and developing computational tools for cultural heritage.

Michael Shah

Mike Shah is a Senior Lecturer in the department of Computer Science at Yale University. His current research topics include geometry, real-time game engines, and computer graphics education. Mike joined Yale from Northeastern University serving as an Associate Teaching Professor. Mike occassionally consults as a Senior 3D Graphics Engineers, and previously has worked at a range of companies including PlayStation and Intel. Mike received his PhD and MS at Tufts University, and his BS from The Ohio State University.

Graphics Course
Graphics 'track' specialization
https://graphics.cs.yale.edu/

Presented by Mike Shah
(michael.shah@yale.edu)

Spring 2025 - Graphics Courses

- General Prerequisites:
  - 223 (Data Structures) as a minimum for all courses
    - Why?
      - You'll get more out of each graphics course with the prerequisites.
      - All of our graphics courses are fairly 'programming intensive'
  - 411 / 511 Building Game engines requires CPSC 323
    - Why?
      - Students need practice building/managing larger sized projects
      - Need more experience in C and a new language 'D lang' taught in the course.
- Programming Language
  - C and/or C++
  - Python
  - Dlang

Graphics Courses Cadence for 2024-2025

- CPSC 446 / 546 - Data and Information Visualization
- CPSC 478 / 578 - Computer Graphics
- CPSC 410 / 510 - Physics Simulation for Movies
- CPSC 479 / 479 - Advanced Topics in Computer Graphics
- CPSC 409 / 509 - Real-Time 3D Computer Graphics Programming
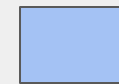- CPSC 411 / 511 - Building Game Engines

*You *may* assume this cadence to repeat
 next year (though never guaranteed).

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🟧	Offered in the Fall
🟩	Offered in the Spring only
🟦	Offered Fall and Spring

CPSC 446 / 546 - Data and Information Visualization

- **Taught**:
  - Fall
- **Goal:**
  - Focus on building data and information visualizations by 'building new frameworks' to visualize and arrange data sets
    - (i.e. This **is not** a course where you just read in data and produce a graph)
- **Unlocks later in the curriculum**:
  - N/A
- **Recommendation(s):**
  - Can take this right after 223
  - May also be interesting to take later on for interdisciplinary studies
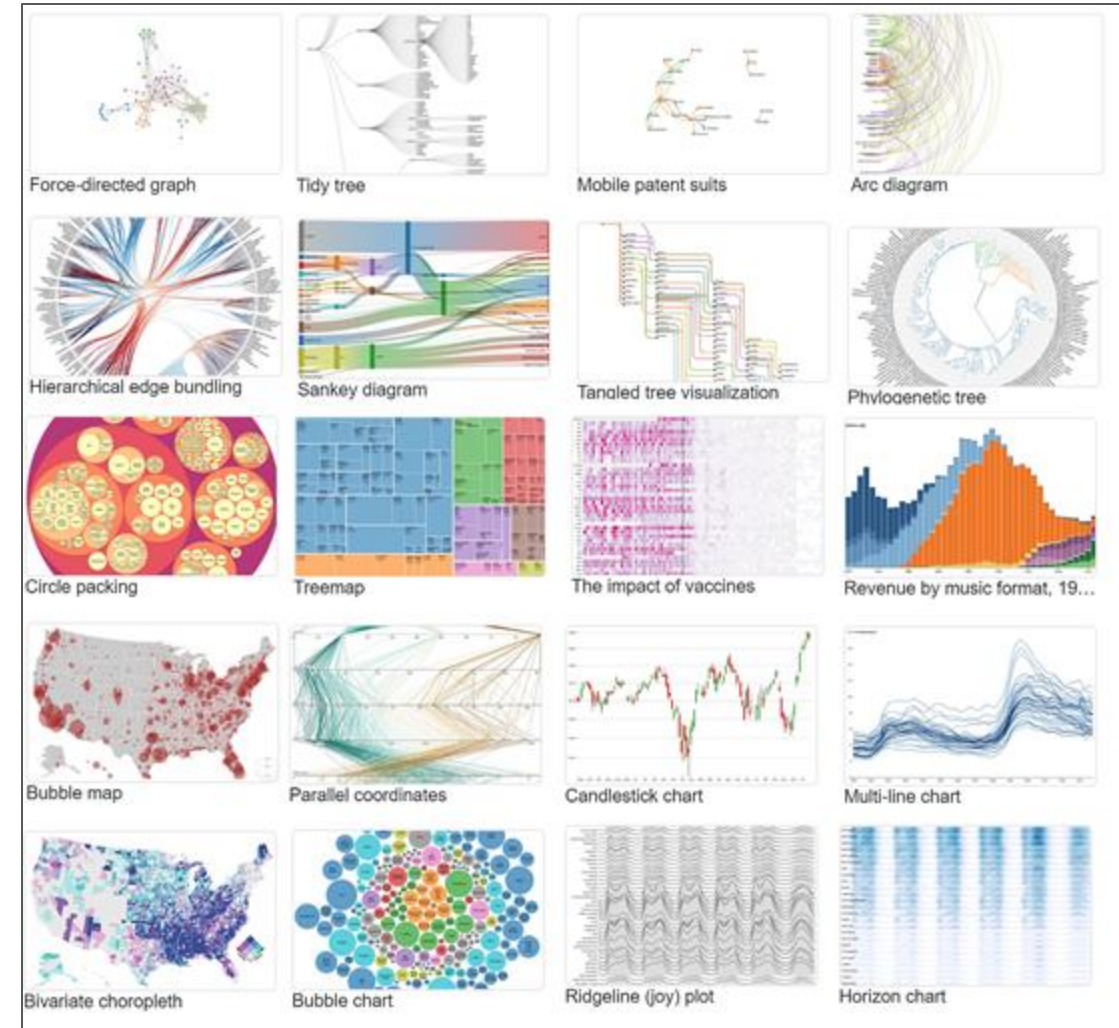
CPC 478 / 578 - Computer Graphics

- **Taught**:
  - Fall
- **Goal:**
  - Build beautiful, movie quality images using math and computer science
- **Unlocks later in the curriculum**:
  - CPSC 410 / 510 - Physics Simulation for Movies
  - CPSC 409 / 511 - Real-Time 3D Computer Graphics Programming
- **Recommendation(s):**
  - Take this in first Fall available to start your graphics journey
    - If you're interested in research / industry internships, you'll want to have taken this course at a minimum
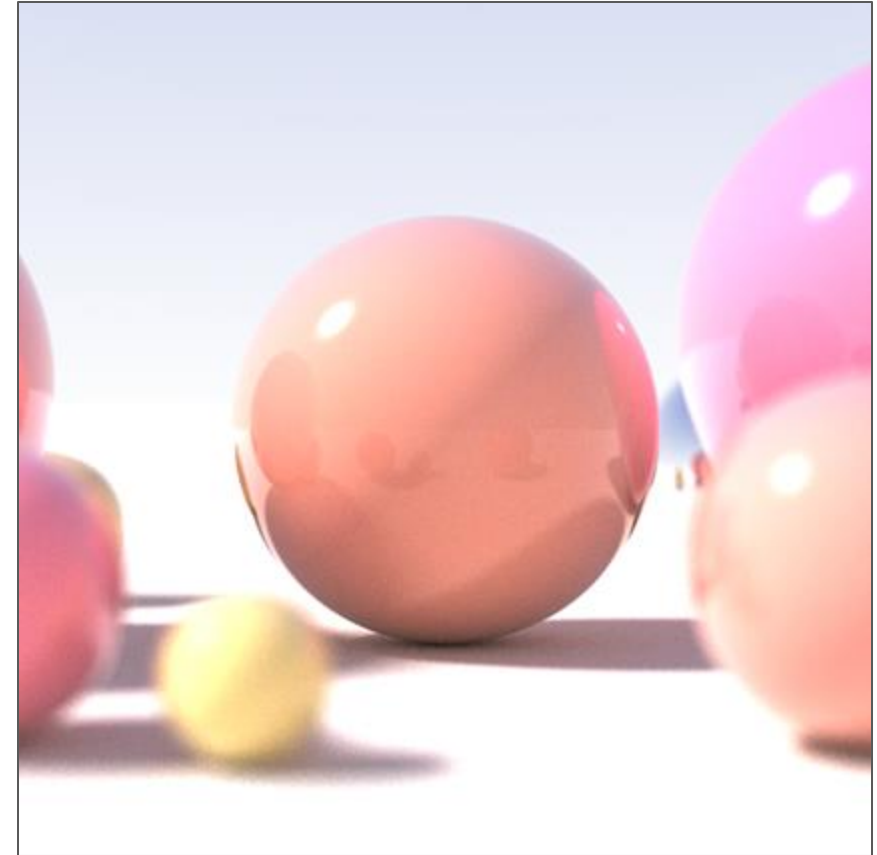
CPSC 410 / 510 - Physics Simulation for Movies

- **Taught**:
  - Spring
- **Goal:**
  - Study and implement state-of-the-art simulation techniques used in the movies (e.g. a Pixar Film)
- **Unlocks later in the curriculum**:
  - N/A
- **Recommendation(s):**
  - Take this after CPSE 478 / 578
  - Projects built can help lead to internship or perhaps research projects

CPSC 411 / 511 - Building Game Engines

- **Taught**:
  - Fall and Spring
- **Goal:**
  - Build a 'game framework' and ultimately a game.
- **Unlocks later in the curriculum**:
  - CPSC 409 / 511 - Real-Time 3D Computer Graphics Programming
- **Recommendation(s):**
  - Recommended to take this semester right after CPSC 323
    - Useful to start building your portfolio for game industry internships asap.
  - Recommended you take 409 / 509 immediately after for continuity of building games (but in 409 / 509 in 3D).

PROCESS INPUT → UPDATE GAME → RENDER
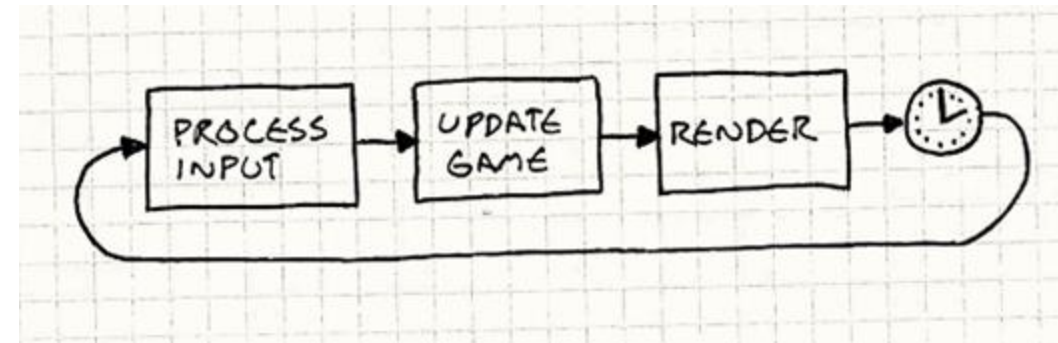
# CPSC 409 / 509 - Real-Time 3D Computer Graphics Programming

- **Taught**:
  - Spring
- **Goal:**
  - Build 3D games using a hardware accelerated graphics (GPU) with an API like OpenGL
- **Unlocks later in the curriculum**:
  - N/A
- **Recommendation(s):**
  - Take this after 'Building Game Engines' or 'Computer Graphics'
    - Continuity in using the D language
    - Ultimately 'build a game' or 'graphics tech demo' at the end that runs in real-time.

CPSC 479 / 479 - Advanced Topics in Computer Graphics

- **Taught**:
  - Spring
- **Goal:**
  - Rotating topic list -- most recently procedural modeling.
  - In-depth study of algorithms, usually with project at the end.
- **Unlocks later in the curriculum**:
  - N/A
- **Recommendation(s):**
  - Take this alongside another graphics course to be fully immersed in graphics when available.
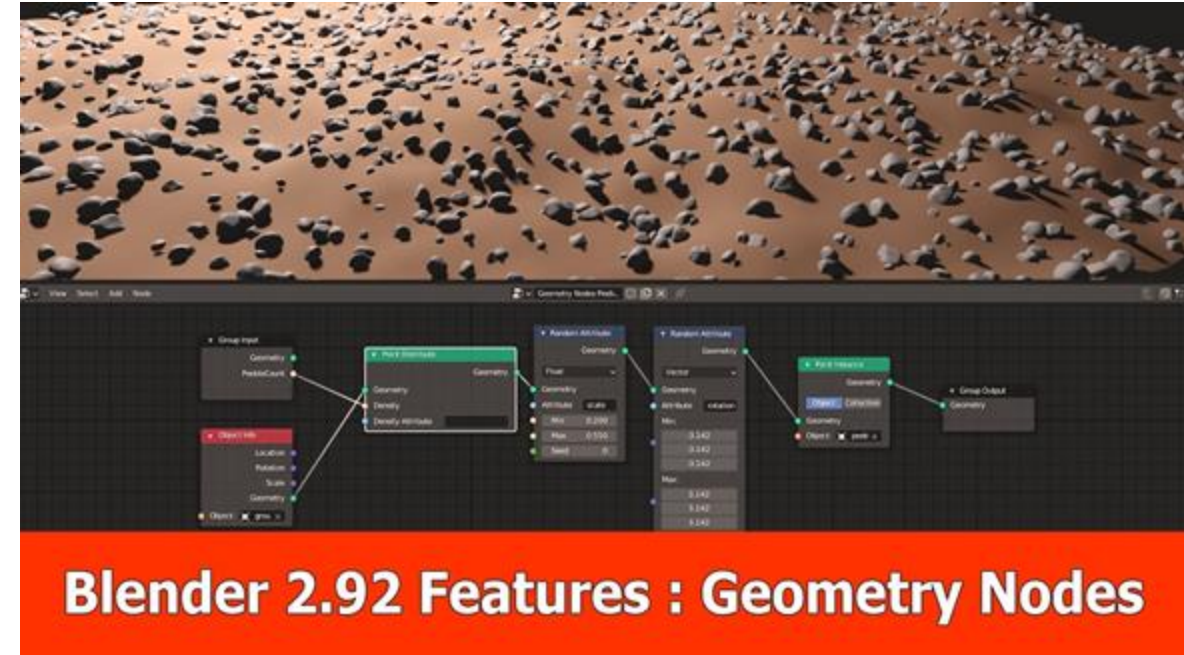
Blender 2.92 Features : Geometry Nodes

Visual, graphics-y, game, etc. courses that may be interesting

- Courses of interest that may be adjacent
  - CPSC 474 / 574 - Computational Intelligence for Games (focuses on building 'AI players' for building games.
  - CPSC 476 - Advanced Computational Vision (machine learning as applied to using computers to 'see/identify' images as input)
    - Other vision course (e.g. CPSC 575, Computational Vision and Biological Perception)
  - Any course in the "Computer Music" may pair well with gaming courses
  - The mathematics used in 'robotics' courses often also overlaps with CPSC 478 Computer Graphics, CPSC 409 Real-time graphics, etc.

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(End Graphics)