COMP 4900 / COMP 5900
Detail Synthesis and Augmentation
Winter 2026

Instructor: David Mould **Email:** mould@scs.carleton.ca **Office Hours:** TBA	**Office Location:** 5346 Herzberg **Class Location:** See Carleton Central **Class Time:** TTh 6:00-7:30
Prerequisites (4900):	one of COMP 3009, COMP 3501, COMP 4102, COMP 4900L

Course Description

This is a specialized course on *image detail*, studying mechanisms for enriching synthetic and photographic images with fine-scale structure. Major themes include texture, image processing, and generative AI. Throughout the term, we will discuss various methods and algorithms, and implement some. The course's final project is typically either a thorough implementation and minor extension of an existing algorithm, or an effort towards creating a novel algorithm.
The main approach to the material is reading the primary literature: several weeks will be spent discussing specific papers, with individual students responsible for leading the discussion.

Topics Covered and Learning Outcomes

Topics to be Covered:
The course's main topics include the following, not necessarily in order.

- Procedural texture and noise
- Low-level image processing operators
- Pyramid-based image representations
- Super-resolution
- Simulation-based methods
- Non-parametric synthesis
- Point distributions
- Non-homogeneous texture
- Pattern synthesis, vector graphics
- Frequency-based synthesis schemes
- Neural approaches, GANs
- Gaussian splatting
- Diffusion models

Important dates and deadlines can be found here: link, including class suspension for fall, winter breaks, and statutory holidays.

Assessments

Grade Breakdown

- Assignments: 25% (probably 3-4 assignments)
- In-class presentations and discussion: 20%
- Course project: 35%
- Final exam: 20%

Beyond the grade calculation given above, students must achieve a raw score of 35% or greater on the final exam (i.e., excluding bonus questions) in order to pass the course.

Important Dates

First day of classes for Winter term: Jan 5
Project deadline: April 8
Last day of classes for Winter term: April 8
Final exam date: TBA, scheduled centrally during the exam period.

Late and Missed Work Policies

Late Work

Beyond a brief grace period, late work will receive a deduction of 10 percentage points per day up to three days (-30%). Work submitted more than three days late will receive a score of zero.

Missed Work

Short-term (<= 5 days): You are expected to begin work on each assignment when it is released, and to upload your progress periodically; in the event that you miss the formal deadline, late submissions are possible as described above. Accordingly, short-term accommodation for assignments is generally not available.
Long-term (> 5 days):
Unavoidable longer-term absences from the course are rare, and a blanket policy cannot consider the relevant details. In the unhappy event that you experience an unavoidable disruption to your studies exceeding 5 days in duration, email your instructor to discuss potential accommodation.

Learning Materials and other Course/Lab Resources

Students are not required to purchase textbooks or other learning materials for this course. The relevant academic literature is available through the university Library.

Graduate Academic Advisors

The Graduate Advisors for the School of Computer Science are available in Room 5302 HP; or by email at grad.scs@carleton.ca. The graduate advisors can assist with under-

standing your academic audit and the remaining courses required to meet graduation requirements.

Undergraduate Academic Advisors

The Undergraduate Advisors for the School of Computer Science are available in Room 5302 HP; or by email at scs.ug.advisor@cunet.carleton.ca. The undergraduate advisors can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The undergraduate advisors will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and Writing Tutorial Services.

SCS Computer Laboratory

Students taking a COMP course can access the SCS computer labs. The lab schedule and location can be found at: https://carleton.ca/scs/tech-support/computer-laboratories/. All SCS computer lab and technical support information can be found at: https://carleton.ca/scs/tech-support/. Technical support staff may be contacted in-person or virtually, see this page for details: https://carleton.ca/scs/tech-support/contact-it-support/.

Academic Accommodations and Regulations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website (https://students.carleton.ca/course-outline/).

Statement on ChatGPT/Generative AI usage

The assignments in this course are designed to be completed individually and without the use of AI assistance. Heavy reliance on AI-generated code will likely prevent you from achieving the assignments' learning goals. Nonetheless, use of AI is not prohibited; you can use AI to help you write code, subject to the following caveats;

- **Your entire submission, including any AI-generated code, is subject to the same code quality requirements, including thorough commenting and justification of design decisions.**
- **Your use of AI must be documented, including submitting a transcript of all sessions which resulted in code that you included in your submissions.**
- **Instructors and TAs will not assist in explaining or debugging AI-generated code.**

Statement on Academic Integrity

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy (see here). A list of standard sanctions in the Faculty of Science can be found here. Additional details

about this process can be found on the Faculty of Science Academic Integrity website. Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy.

Student Rights and Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If you have any concerns regarding this course, your first point of contact is me. Please email me or visit office hours, and I will do my best to address your concerns. If I cannot resolve the issue, the next point of contact is the School of Computer Science at studentconcerns@scs.carleton.ca. If the concern remains unresolved, the final point of contact is the Office of the Dean of Science at ODScience@carleton.ca. Please follow this order of contact. Note: You can also bring your concerns to Ombuds services.