

COURSE OUTLINE IDES 3106A • ADVANCED COMPUTER APPLICATIONS • Fall (2022)

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Course Time and Location: Please refer to Carleton Central under Student Services – Registration or Search Schedule: https://central.carleton.ca/prod/bwysched.p_select_term?wsea_code=EXT

Course Description

Examination of complex product geometry utilizing 3D computer applications. Topics include spline, surface and solids construction, surface verification tools, and rendering tools and techniques. Workflow, robust design, reverse design techniques and 3D printing will be explored through exercises.

Includes: Experiential Learning Activity.

Prerequisite(s): IDES 2105.

Lecture and tutorials three hours a week.

Learning Outcomes

By the end of this course, students will be able to:

1. Achieve a higher competency in industrial design product development and planning, using 3D CAD software and rendering.

2. Have a holistic understanding of solids and surface types feature creation methods in Solidworks (SW).
3. Construct complex geometries in SW utilizing surface feature tools.
4. Edit various surface types including surface offsets and trims.
5. Use hybrid modeling techniques such as using surfaces to modify and create solids.
6. Utilize a planned workflow approach for achieving design intent for complex geometries and assemblies.
7. Create and control splines and curves in a 3D CAD environment.
8. Apply a more robust modeling strategy for part and feature creation by applying best practices in regards to SW sketches, dimensions, and feature creation and control.
9. Create thin-walled parts for injection molding and typical features such as ribs and bosses.
10. Be familiar with the design of small electronic housings.
11. Apply reverse designing techniques.
12. Create robust assemblies and multi-body parts.
13. Be familiar with surface transitions and radius of curvature issues such as CO, C1, and C2 Continuity.
14. Describe tolerances, allowances, and types of fit.
15. Render advanced photo-realistic representations of 3D CAD models in Keyshot and integrate context.
16. Apply technical drawing standards for injection molded parts.
17. Prepare a model for 3D printing.

Course Deliverables

These are the deliverables for this course. Please see 'Appendix A Course Schedule' for more detailed information.

Lab exercises - (10 labs, 3% each) 30%

Quiz 1 – Oct 31st - 10%

Project planning report – Oct 31st – 5%

Quiz 2 – Nov 28th – 10%

Major project CAD file must be submitted to lab for printing – week of Nov 21-24th

Major project 3D printed part (in class) and CAD (uploaded) due – Nov 28th

Major project written report due - Dec 9th - 45%

Student Access to Quiz, Test and Exam Papers

Examinations are for evaluation purposes only and will not be returned to the student.

Required Materials

Materials required for the course are listed below. You may be asked by your instructor to refer to Brightspace for a more comprehensive list of required materials.

Students will require the regular use of measuring calipers during the course.

The current version of Solidworks (as supplied by the School of Industrial Design) must be installed before the first scheduled class.

Computer Requirements

Please refer to the computer requirements on the School of Industrial Design Website. You may be asked by your instructor to refer to Brightspace for other information or requirements related to computer work.

<http://www.id.carleton.ca/undergraduate/about-the-bid-program/computer-requirements>

Individual/Group Work

Courses may include individual and group work. It is important in collaborative work that students clearly demonstrate their individual contribution.

Review/Presentation Attendance

Attendance at scheduled SID Reviews/Presentations is mandatory. These are equivalent to exams when indicated in the course outline. Failure to attend the Review/Presentation without reasonable cause, will result in a grade of F. Students arriving late for the Review/Presentation or not remaining for the complete session without approval from the instructor, will be addressed on a case-by-case basis at the discretion of the instructor.

If you are not able to attend a Review/Presentation, foresee arriving late or need to leave before it is complete, please email your instructor in advance explaining the reason for the situation. It is important that you provide a reasonable rationale for your absence, late arrival or early departure. In the event of an illness or death in the family, you will be required to sign a form verifying your claim and this form is available through the SID administration office.

Late Submission of Lecture & Studio Deliverables

Students who do not hand in deliverables on time will have their earned grade reduced by 10% per day up to a maximum of 3 days.

Participation and Professionalism

Active participation and professional conduct (e.g. class discussion, consultations with instructors, work ethic, etc.) are important in lecture and studio courses and may be formally evaluated by a grade. Professionalism also includes Carleton's Policy on Academic Integrity described in more detail below with links to content which you are required to review.

Academic Integrity

Carleton's Policy on Academic Integrity is available at: <https://carleton.ca/registrar/academic-integrity/> and covers the following topics:

Plagiarism (e.g. submitting work in whole or in part by someone else, failing to acknowledge sources through the use of proper citations when using another's work).

Test and Exam Rules (e.g. attempting to read another student's exam paper, speaking to another student even if the subject matter is irrelevant to the text, using material not authorized by the examiner).

Other Violations (e.g. improper access to confidential information, disruption in classroom activities, misrepresentation of facts for any academic purpose).

This policy governs the academic behavior of students. In industrial design, ideas and concepts come from a multitude of sources and may be modified and utilized in the design and development process. The student should reference such sources appropriately and it is strongly advised that you read Carleton's Policy on Academic Integrity prior to conducting any work at the University.

Requests for Academic Accommodation

You may require special arrangements to meet your academic obligations during the term. For an accommodation request for any of the following topics below, refer to the link provided for more information: <https://students.carleton.ca/course-outline/>

- *Parental Leave*
- *Religious/Spiritual Obligation*
- *Academic Accommodations for Students with Disabilities*
- *Survivors of Sexual Violence*
- *Accommodations for Student Activities*

Student Responsibility

The student is responsible for knowing the content of this course outline; the schedule of classes, assignments, and/or Reviews; and the material that was covered when absent. The studio is a professional environment and students should be working during the scheduled hours.

Unless otherwise arranged, the class will meet during scheduled class hours. Please note that attendance is important since issues and questions may be raised in class, and announcements made, along with information disseminated through Brightspace. As external professionals are often involved in our work, scheduling changes for guest lectures, presentations, and Reviews may occur at short notice, requiring students to stay informed.

Changes to the Course Outline

The course outline may be subject to change in the event of extenuating circumstances.

Appendix A - Course Schedule

Sept 12th – Week 1 – Introduction

Sept 19th – Week 2 – Robust Geometry and Design Intent

Sept 26th – Week 3 – Surfacing – **submit chosen part for final project approval**

Oct 3rd – Week 4 – Rendering Techniques

Oct 10th – Thanksgiving – no class

Oct 17th – Week 5 – Surface Tools

Oct 24th – Fall break

Oct 31st – Week 6 – Surface Tools + **Project Planning Report due + Quiz 1**

Nov 7th – Week 7 – Surface Tools

Nov 14th – Week 8 – Surface Tools

Nov 21st – Week 9 – Assemblies and Multibodies

* Nov 21-28th - * Parts must be 3D printed this week

Nov 28th – Week 10 – CAD for manufacturing + **CAD and 3D printed part due + Quiz 2**

Dec 5th – Week 11 – Technical Drawings

Dec 9th – **Final Project Due**