Course Outline IDES 2102 • Series and Mass Production Technology B •

Winter (2020)

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Office Hours: By Appointment

Time and Location: Please refer to Carleton Central under Student Services – Registration – Search Schedule: https://admissions.carleton.ca/faqs/where-can-i-find-the-class-schedule/

Course Description
Continuation of IDES 2101. Transformation techniques applied to manufacturing materials. Part-design requirements and cost factors for manufacturing processes. The influences and role of assembly, finishing, production tooling, costing are addressed. Includes: Experiential Learning Activity.
Prerequisite(s): IDES 2101 or permission of the School of Industrial Design. Lecture and tutorials three hours a week, laboratory three hours a week.

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

1. Demonstrate a process for comparing and contrasting different types of common plastic materials in terms of performance characteristics particular to their intended use (UV, temperature, impact, creep, cost etc.)
2. Be familiar with plastic raw material including rod, tubing and sheet stock as well as pellet forms.
3. Describe the main manufacturing processes for thermoset and thermoplastics materials in terms of tooling and raw material requirements.
4. Compare and contrast various plastic manufacturing processes in terms of production quantity, quality and cost as a function of mass production volumes.
5. Be aware of important life cycle issues in regards to regrind, material identification, degradable plastics.
6. Describe the fundamental requirements for plastic part design as it relates to various plastic manufacturing processes.
7. Be aware of Digital Additive Manufacturing processes including powder, liquid and solid extruded technologies
8. Be familiar with the primary difference between prototyping and manufacturing.
9. Be able to design simple jigs and fixtures for plastic fabrication from sheet materials
10. Work as a team and use each other's resources effectively.
11. Write a technical report.
12. Work safely in the lab under supervision by professional staff.

Course Deliverables

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

<table>
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<tr>
<th>Exams</th>
<th>Labs and Quizzes</th>
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<tbody>
<tr>
<td>Mid-term</td>
<td>Lab no.1</td>
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<tr>
<td>Final</td>
<td>Lab no.2</td>
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<td>Quizzes (6)</td>
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<td></td>
<td>Mass Pro Trip Participation</td>
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Note: The Mass Pro Trip is a requirement and must be completed to satisfy the course completion.

- A passing grade must be attained in the final exam and lab sections of the course in order to receive a passing grade on the course.
- The mid-term will be returned to the student to aid in studying.

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 cuLearn for a more comprehensive list of required materials.

Text Books:

de Leeuw, M., *Series and Mass Production Technology for Product Design*. You are advised to make your own notes alongside this text during class. (Note: Text book is the same as used for IDES2101).


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 cuLearn 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 XX% 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/](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 cuLearn. 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**

See next page.
| Week 1 | Jan. 9 | Lecture | • Introduction to Course  
• Polymer Families  
• Material Spotlight – Styrenes, PEs |
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<tbody>
<tr>
<td>Lab</td>
<td>No Lab in Week 1</td>
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<tr>
<td>Homework</td>
<td>de Leeuw Chapter 5 (pgs 1-11)</td>
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| Week 2 | Jan. 16 | Lecture | • Thermoforming  
• Creating wood fixtures and jigs  
• Quiz 1 – Polymer Families  
• Material Spotlight – PMMA, PC, PSO |
| Lab | Work on Lab 1 |
| Homework | de Leeuw Chapter 6 (pgs 1-21) |
| Week 3 | Jan. 23 | Lecture | • Injection Molding Part 1  
• Injection Molds and Basic Parts  
• Quiz 2 - Thermoforming  
• Material Spotlight – ABS, PP, POM |
| Lab | Work on Lab 1 |
| Homework | de Leeuw Chapter 2 (pgs 1-35) |
| Week 4 | Jan. 30 | Lecture | • Injection Molding Part 2  
• Multi-Shot Parts, Structural Foam, Decoration  
• Quiz 3 – Injection Molding  
• Material Spotlight – CAs, TPEs, PAs |
| Lab | Lab 1 Progress Check |
| Homework | de Leeuw Chapter 3 (pgs 11-19), Chapter 7 (pgs 1-14), Chapter 8 (pgs 1-20) |
| Week 5 | Feb. 6 | Lecture | • RIM Molding, Blow Molding, Rotational Molding  
• Quiz 4 – Structural Foam vs. RIM Molding  
• Material Spotlight – PUR, PFs, PVC, EVA |
| Lab | Final Hand in of Lab 1 – by 4 pm in the labs, Report due online Feb. 9 |
| Homework | de Leeuw Chapter 3 (pgs 1-11) |
| Week 6 | Feb. 13 | Midterm |
| Week 7 | Feb. 20 | Fall Break |
| Week 8 | Feb. 27 | Lecture | • Composites + Alloys Intro, Extrusion / Pultrusion, Compression Molding  
• Material Spotlight – Fiberglass, Polyester, Epoxy |
| Lab | Work on Lab 2 |
| Homework | de Leeuw Chapter 4 (pgs 1-11), Chapter 9 (pgs 1-13) |
| Week 9 | Mar. 5 | Lecture | • Composites + Alloys, Rapid Prototyping Technologies  
• Quiz 5 – Composites Intro  
• Material Spotlight – Carbon Fibers, Graphite, Common RP Polymers |
| Lab | Anodizing Demonstration Lab |
| Homework | de Leeuw Chapter 10 (pgs 1-38) |
| Week 10 | Mar. 12 | Lecture | • Woods, Paints + Finishes  
• Quiz 6 – Finishes and Decoration |
| Lab | Work on Lab 2 |
| Homework | de Leeuw Chapter 20 (pgs 1-25), Chapter 17 (pgs 1-29) |
| Week 11 | Mar. 19 | Trip | **Mass Pro Trip – TBD**  
(Note: Trip may be moved to a different week, depending on site availability) |
| Week 12 | Mar. 26 | Lecture | • Final Presentations  
• All Presentations due by 6:00 pm |
| Week 13 | Apr. 2 | Lecture | • Final Presentations |