

**COURSE OUTLINE IDES 2101A • DESIGN FOR MANUFACTURING A • FALL(2021)**

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**Instructor: Steven Macleod**

Steven.Macleod@carleton.ca

Location: remote

Office Hours: Enter Day/Time or preferred statement.

**Teaching Assistant: Zahra Alizadeh Elizei**

ZAHRAALIZADEHELIZEI@cmail.carleton.ca

Office Hours: Enter Day/Time or preferred statement.

**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**

Transformation techniques applied to manufacturing materials. Part-design requirements and cost factors for manufacturing processes. Influences and role of assembly, finishing, production tooling, and costing. Includes: Experiential Learning Activity. Prerequisite(s): IDES 1001, IDES 1301. 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. Be familiar with main properties and characteristics of wood and wood joinery.
2. Demonstrate a process for comparing and contrasting different types of ferrous and non-ferrous materials in terms of performance characteristics particular to their intended use (corrosion, strength, appearance, weight, finishing, cost etc.).

3. Describe various forms of raw materials including metallic tubing, rod, pipe, sheet stock and ingots. Describe sheet metal, casting and extrusion based metallic manufacturing processes in terms of part design, tooling and raw material requirements. punching, bending).
4. Compare and contrast various metal manufacturing processes in terms of production quantity, quality and cost as a function of mass production volumes.
5. Describe the fundamental design requirements for tube bending and perform tube bending under safe supervision of professional technician.
6. Describe and perform basic machining operations including milling, turning and drilling, under the safe supervision of a professional technician.
7. Be familiar with main properties and characteristics of fabrics and sewing.
8. Be able to source fasteners for various assembly operations.
9. Describe the fundamental design requirements for metal casting.
10. Be aware of important life cycle issues in regards to metals, wood and fabrics.
11. Work as a team and use each other's resources effectively.
12. Write a technical report.
13. Work safely in the lab under supervision by professional staff.
14. Describe a typical manufacturing facility.

### Course Deliverables

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

Exams		Labs and Quizzes	
Mid-term	15	Lab. no.1	30%
Final	35	Lab. no.2	10%
	—	Quizzes	10%
	50%	+	50% = 100%

## **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*

1. De Leeuw, Series and Mass Production Technologies for Product Design (Availability to be announced in class)
2. Kula, D., Materiology (Available at Amazon/Chapters web stores)

### *Recommended Supplementary Books*

Lefteri, C., Materials for Inspirational Design, covers inspirational innovative use of materials and processes. (Available at Amazon/Chapters web stores)

Lefteri, C., Making It, more general and visual in composition, but compliments de Leeuw's book well if you have trouble with some of the technical references. (Available at Amazon/Chapters web stores)

## **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 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 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 for Course Schedule

<b>Week 1</b> Sept. 9	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Introduction</b></li> <li>• Lab Assignment #1 - ID Facilities and Resources</li> <li>• Overview of Basic Cutting and Bending Technologies</li> <li>• Materials Focus - Iron + Steel</li> </ul>
	Readings	Deleeuw Pg 39-44 and Chapter 12 pg 1-23
<b>Week 2</b> Sept. 16	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Creating Design Intents</b></li> <li>• Choosing materials and manufacturing in your workflow</li> <li>• Materials Focus - Steel Alloys</li> <li>• Sheet Materials and Bending Techniques</li> </ul>
	Readings	Materialogy Book - Metals Chapter
<b>Week 3</b> Sept. 23	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Drawing, and Pressing</b></li> <li>• Material Focus - Stainless Steels</li> <li>• Lab 1 Technician Consultations</li> <li>• Quiz 1 - Steel Alloys</li> </ul>
	Readings	Deleeuw Chapter 12 pg 24-end
<b>Week 4</b> Sept. 30	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Machining</b></li> <li>• Materials Focus - Wrought Aluminum Alloys</li> <li>• Design Intents Due for Lab Technicians Approval</li> <li>• Quiz 2 - Sheet Forming, Drawing, Pressing</li> </ul>
	Readings	Deleeuw Chapter 13
<b>Week 5</b> Oct. 7	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Forming + Extrusion</b></li> <li>• Materials Focus - Titanium Alloys</li> <li>• Quiz 3- Machining + Forming</li> </ul>
	Readings	Deleeuw Chapter 14
<b>Week 6</b> Oct. 14	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Expendable Mold Casting,</b></li> <li>• Quiz 4- Machining + Forming</li> <li>• Materials Focus - Cast Aluminum Alloys</li> <li>• <b>Lab 1 Project + Report Due</b></li> </ul>
	Readings	Deleeuw Chapter 15
<b>Week 7</b> Oct. 21	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Permanent Mold Casting, Part 1</b></li> <li>• Materials Focus - Zinc Alloys</li> <li>• Quiz 5 - Expendable Mold Casting</li> </ul>
	Readings	Deleeuw Chapter 16
<b>Week 8</b> Oct. 25-29		<b>Fall Break</b>
<b>Week 9</b> Nov. 4	<i>Midterm</i>	<b>Midterm</b> <ul style="list-style-type: none"> <li>• Lab 2 Assignment</li> </ul>
<b>Week 10</b> Nov. 11	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Permanent Mold Casting, Part 2</b></li> <li>• Materials Focus - Magnesium Alloys</li> <li>• Quiz 6 - Permanent Mold Casting</li> </ul>
	Readings	Deleeuw Chapter 16
<b>Week 11</b> Nov. 18	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Fasteners, Adhesives, and Fabrics</b></li> <li>• Galvanic Corrosion</li> <li>• Quiz 7 - Fasteners and Fabrics</li> </ul>
	Readings	Deleeuw Chapter 18
<b>Week 12</b> Nov. 25	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Wood Products and Joinery in Woods</b></li> <li>• Quiz 8 - Wood Joinery</li> </ul>
	Readings	Deleeuw Chapter 20
<b>Week 13</b> Dec. 2	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Ceramics and Glass</b></li> <li>• Quiz 9 - Ceramics and Glass</li> </ul>
	Readings	Deleeuw Chapter 19
<b>Week 14</b> Dec. 9	<i>Lecture</i>	<ul style="list-style-type: none"> <li>• <b>Finishes and Coatings for Metals and Woods</b></li> <li>• <b>Lab 2 Due</b></li> <li>• Quiz 10 - Finishes and Coatings</li> </ul>
	Readings	Deleeuw Chapter 17