

San José State University
Department of Design / Industrial Design Program
DSID 143, Adv. Materials, Processes & Technology Spring 2022

Instructor:	Prof. Kohar Scott
Office Location:	Virtual (by appointment) or in-person Art 113
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Office Hours:	M/W 11:00am – 12:00pm by appt. , or by prior arrangement via Zoom or phone.
Class Days/Time:	M/W 3:00pm – 5:50pm
Classroom:	Zoom (see Canvas for link)
Prerequisites:	DSID 41
Course Fees:	Course fees collected for DSID143 are part of your SSETF fees and will be used to supplement the costs of tools and supplies for this class. A portion of those fees are also used to staff Student Assistants and machine maintenance in the 3D Seid Innovation Lab.

Canvas Course Management Website & Course Format

This course is intended for an in-person format this term, however durations of the course are required to be remote due to Covid-19 surges and safety concerns. Remote instruction will include some synchronous class meetings as well as asynchronous class activities. Course materials such as the syllabus, assignment handouts, reading, grading, etc. may be found on the DSID 143 course Canvas website. You may find your link to this website on MySJSU, along with your login/password info. You are responsible for regularly checking with the messaging system in Canvas for course updates, assignments, etc. All class correspondence and grading will be managed through the class Canvas site. If you do not check Canvas often, you should set up your email forwarding to forward all class correspondence to your preferred email address. Key topics to check on Canvas are the Calendar, Announcements, Modules, Discussions, and Grades. Any last minute updates will be posted to Announcements, the entire semester schedule is detailed in the Syllabus and Calendar, and your progress in the course can be tracked through Grades. Please view Canvas as a tool for Active Learning. You must have access to a computer and the internet to be able to access the Canvas site. You may also use a tablet or your phone. Some assignments will be required to be turned in on Canvas, in which case you will need to have access to some basic software such as MS Office (MS Word, PowerPoint, Excel) or equivalent (such as G Suite software), Adobe Acrobat (for making pdfs), and basic scanning

software for scanning sketches to upload to the assignment portal, [Adobe Creative Cloud](#), [Autodesk Sketchbook](#), and [Autodesk Fusion 360](#).

See [University Policy F13-2](#) at <http://www.sjsu.edu/senate/docs/F13-2.pdf> for more details.

Course Description

Advanced Materials, Processes and Technology will build and expand on themes covered in Materials and Processes I. Scaffolded by a basic understanding of materials and processes, this class will explore application of more advanced strategies, work within limitations, and integration of material and manufacturing constraints while still prioritizing design objectives. Color, material, and finish (CMF) strategies will play a role in deeper design consideration of student projects. Throughout the term, students will build a consolidated reference library of research and inspiration. Students will have the opportunities to apply their research and studies to one of their own portfolio projects to develop it more accurately, thoroughly, and technically for production.

Course Goals:

Student Learning Objectives

While the previous course (DSID 41) focused on the most common materials and processes used in the design industry, this course will focus on the less common, more advanced and cutting edge materials and processes, and additionally will integrate discussions about technology and its role in the design process. It will also address the process of taking a design from initial concept through production specifications and manufacturing quotations. The course will culminate in a designed and documented product enclosure that demonstrates the students' integration of knowledge from the term.

Understanding the relevance of new technologies (the difference between reality and blue sky) and their implications in the objects and services we design is key to having a greater understanding of the role of design and its myriad applications. Students will be required to keep detailed notes and a digital notebook of lectures, presentations, and discussions from the term to submit as part of their final participation grade.

Students will complete during the semester:

- 1) Weekly project assignments, and presentations taking a design from initial concept through industrial design control files ready for development of production documentation. (LO 1-8)
- 2) Final project depicting a product design with materials and processes as primary design criteria in both high-volume and low-volume. (LO1 and LO8)
- 3) Final digital presentation on a new, advanced, or exotic manufacturing process. (LO3, LO4, and LO7)
- 4) Research and development of a Materials and Processes Glossary of terms and acronyms. (LO2, LO6)

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

- (LO1) Integrate materials and manufacturing processes into the design process.
- (LO2) Integrate color into the design process.
- (LO3) Identify, through research and sourcing of information, advanced materials and manufacturing processes.
- (LO4) Select or recommend materials and manufacturing processes with consideration for functional and aesthetic CMF (color, material, finish).
- (LO5) Cite the rationale for selecting particular materials and manufacturing processes.
- (LO6) Employ various research methods to source information; evaluate the application and timing of integrating new and emerging technologies in product designs.
- (LO7) Generate the details required to document and specify a design for manufacture.
- (LO8) Utilize and articulate additional considerations in the selection of production materials and processes, including: sustainability, durability testing,, assembly, and shipping/packaging.

Required Texts/Readings

Textbooks: (You should already have this from DSID41)

Thompson, Rob. *Manufacturing Processes for Design Professionals*. Thames and Hudson. 2007. ISBN 978-0-500-51375-0)

Other Recommended Readings

1. Becerra, Liliana. *CMF Design: The Fundamental Principles of Color, Material and Finish Design*. Frame Publishers. 2016.
2. Feisner, Edith Anderson and Reed, Ron. *Color Studies (3rd Edition)*. Bloomsbury Publishers Inc. 2014.
3. Thompson, Rob. *Prototyping and Low-Volume Production (The Manufacturing Guides)*". (2011, Thames & Hudson) ISBN-13: 978-0500289181
4. Lefteri, Chris. *Making It: Manufacturing Techniques for Product Design*. Laurence King Publishers. 2007. ISBN 978-1856695060
5. Lefteri Chris. *Materials for Inspirational Design*. Publisher: RotoVision (January 1, 2007). ISBN-13: 978-2940361502
6. Dent, Andrew H, and Sherr, Leslie. *Material Innovation Product Design*. (2014, Thames & Hudson) ISBN-13: 978-0-500-29129-0
7. Ashby, M.; Johnson, K. *Materials and Design: The Art and Science of Material Selection in Product Design*, Butterworth-Heinemann; 2nd Edition (October 26, 2009) ISBN-13: 978-1856174978
8. Rob Thompson. *Product and Furniture Design (The Manufacturing Guides)*. Thames & Hudson (April 1, 2011). ISBN-13: 978-0500289198
9. Lefteri, Chris. *Plastics 2 (Materials for Inspirational Design)*. RotoVision (March 1, 2006). ISBN-13: 978-2940361069

11. Lefteri, Chris. *Wood (Materials for Inspirational Design)*. RotoVision. (March 1, 2005). ISBN-13: 978-2880468125
12. Lefteri, Chris. *Glass (Materials for Inspirational Design)*. Rockport. 1st Edition edition (September 2002). ISBN-13: 978-2880465698
13. Lefteri, Chris. *Ceramics (Materials for Inspirational Design)*. RotoVision (June 1, 2003). ISBN-13: 978-2880466688
14. Brownell, Blaine. *Transmaterial 3: A Catalog of Materials that Redefine our Physical Environment*. Princeton Architectural Press (February 3, 2010). ISBN-13: 978-1568988931
15. Thompson, Rob. *Graphics and Packaging Production (The Manufacturing Guides)*. Thames & Hudson; 1 edition (May 1, 2012). ISBN-13: 978-0500289884
16. Lesko, Jim. *Industrial Design: Materials and Manufacturing*. Wiley. (August 11, 2011). ISBN-13: 978-0471297697
17. Jim Lesko (Author). *Industrial Design: Materials and Manufacturing Guide*. Wiley; 2 edition (December 14, 2007. ISBN-13: 978-0470055380
18. Dell K Allen (Author), Robert H Todd. *Manufacturing Processes Reference Guide*. Industrial Press, Inc.; 1st edition (January 1, 1994), ISBN-13: 978-0831130497
19. Ashby, Michael F.. *Materials Selection in Mechanical Design*, Fourth Edition. Butterworth-Heinemann; 4 edition (October 5, 2010). ISBN-13: 978-1856176637
20. Guidot, Raymond, Toulard, Jean-Baptiste, Grenier, Jean, Salomon, Jean-Jacques. *Industrial Design Techniques and Materials*. Publisher: Flammarion (September 5, 2006). ASIN: B005X4FBUW
21. Kalpakjian, Serope, Schmid, Steven. *Manufacturing Processes for Engineering Materials (5th Edition)*. Prentice Hall; 5 edition (July 27, 2007). ISBN-13: 978-0132272711

Required Materials List

Recommended Materials List

- Computer capable of running Adobe Photoshop and Illustrator or other equivalent software and Solidworks.
- Tablet PC that can use a pressure sensitive stylus recommended.
- Solidworks Software
- Fusion 360 Software
- Keyshot Software
- Molding and casting kit (recommended links on Canvas)

Required by first class meeting:

- Microsoft Office Software (Student Edition)
- Adobe Design Suite Software (Student Edition)

Course Fees

Course fees collected for DSID 143 will be used to supplement some costs of modeling supplies for this class and for running the ID Labs and maintaining equipment.

Library Liaison

Design Department Librarian
Gareth Scott
Email: gareth.scott@sjsu.edu
Phone: (408) 808-2094

Classroom Protocol

Due to COVID-19 Shelter-In-Place policies, students are expected to be on time to the class meeting on Zoom. Critiques, Lectures, and demonstrations will typically happen at the beginning of the class so being in the classroom on time is important to gaining the content of the class. Attendance will be taken at the beginning of each class period as one of the ways to quantify class participation (if you aren't there, you can't participate). Attendance will sometimes be taken at the end of class. Active participation in class activities is a significant factor in a student's success in the Industrial Design program. When a class critique is planned, work should be ready to display on your screen during critiques at the official start of the class period. Students are to be respectful of the professor and their peers and any disruptive activities in the classroom will result in the student being asked to leave the class. Arriving late to class without prior arrangement and approval from the professor is considered disruptive. If a student encounters any problems that inhibit their ability to participate in the class, please provide as much advance notice as possible to the instructor so that he/she may respond and inform the student in a timely manner.

Cell phones, tablets, and even laptops can be disruptive and inconsiderate to your classmates and the instructor when used for anything unrelated to the class meeting. Some of these devices may be used in this class and but should be disabled and turned off during times they are not being used. If a device is to be used for a class activity the instructor will inform you in advance. ***Phones for personal use are NOT permitted in this class*** and you will be asked to turn off and store your phone at the start of each class. If you disrupt or withdraw from class activities due to your inability to silence and ignore any of these devices, it will count against the participation portion of your final grade and you will be asked to leave the classroom. Additionally, talking out of turn in class during a lecture is considered disruptive to the class and will adversely affect the participation grade and you may be asked to leave the classroom. If emergency personal issues (documented family, medical, etc) require you to leave your phone on, please make arrangements with the instructor prior to and *in advance* of the start of class.

The COVID-19 pandemic has created a worldwide disruption to business as usual. That can be seen solely as an inconvenience or, potentially, as an opportunity. Telecommuting work-from-home has become the new normal in business and education creating both challenges and new opportunities. It is accelerating the transformation of business from an office bound workday to work that can be conducted from anywhere there is a decent Wifi connection. This class is an opportunity to learn how to work in an online community of your instructors and fellow peers in a similar manner as you may be called upon to telecommute occasionally upon graduation. With that in mind, you should conduct yourself in a professional manner that is respectful to your instructor and peers while collaborating in the Zoom environment. That means being present with your camera on (audio

should be muted except when asking questions and contributing in class), wearing appropriate classroom attire, avoiding anything in your video environment that may be offensive to others and behaving like a respectful member of the class.

Assignments and Grading Policy

Course assignments are project and participation-based. This course is about scaffolding materials and manufacturing knowledge into real-world practice. Students will have homework assignments to do outside of class (up to 9 hours per week) that include reading, research, sketching, analysis/reports, 2D and 3D CAD. (LO 1-8). Students will be required to turn in all Research Reports at the mid-term date and present between that date and the end of the semester (LO 1-8). Students will be required to turn in and present their final project (3D Printer) by the second to last day of class (LO 1-8). Grading will follow the standard SJSU A-F system.

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A+, A, A- / 100+ - 91% / Excellent (perfect, near perfect and professional level)

B+, B, B- / 90 – 81% / Above Average (A few minor imperfections and clearly above class average in quality and completeness)

C+, C, C- / 80-71% / Average (Assignment is completed at average level of quality and completeness)

D / 70-61% / Below Average (One or more parts of assignment missing. Did not follow direction. Work is below average level of quality)

F / Below 61% / Failure (did not complete a significant aspect of the assignment and/or work well below average).

Grading is weighted as follows:

Class Activity Participation (LO 1-8): 40%

Application Project (LO 1-8): 30%

Course process book (LO 1-8): 30%

Grades for assignments will be divided evenly throughout the semester and receive equal credit. All assignments are due on time. No late work is accepted. No assignments will be accepted via email or Canvas. However, your final presentation will be reviewed at the end of the semester, and will be graded on completeness (so you should include all assignments, even those not previously turned in) and presentation quality. Therefore, all projects should be included in this presentation and reworked if substandard. Extra credit is not possible in this course as the workload is significant enough. A passing grade for this course is a C. The Participation grade in this course will be assessed through your engagement in presentations, critiques, videos, and field trips. Actively engaging and exhibiting life-long learning skills during class are the mode by which participation is assessed.

University Policies

SJSU's Office of Graduate and Undergraduate Programs maintains university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. You may

find all syllabus related University Policies and resources information listed on [GUP's Syllabus Information Web Page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>.

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Course Schedule

Schedule is subject to change with fair notice in class or via notice on Canvas.

Week	Date	Topics, Readings, Demos, Assignments, Deadlines
Week 1	W 1/26	Lecture: Course Introduction Assigned: Start Canvas module 1; Find and present an inspiring example of an advanced material Activity: Discussion 1: Choose a past product in your portfolio to use in this class (low volume and high volume production)
Week 2	M 1/31 W 2/02	Lecture topic: CMF (case study: Hip Hook) In-class Activity: A3.1 Hip Hook existing product spec Assigned: Start low/high volume product design
Week 3	M 2/07 W 2/09	Lecture topic: CMF - material (case study: Hip Hook) Due: A3.1 Assigned: A3.2 Market Research Activity: Discussion 3: Consideration of surface finish February 21st demo by Autodesk on Topology Optimization
Week 4	M 2/14 W 2/16	Lecture topic: CMF- finish (case study: Hip Hook) Due: A3.2 Assigned: A3.3 Material Research Activity: Discussion 4: Case study CMF refinement
Week 5	M 2/21 W 2/23	Lecture topic: CMF (case study: Hip Hook) Advanced high-volume manufacturing (IMD, Co-molding, etc) Due: A3.3 Assigned: A3.4 Activity: Discussion 5 Case study final presentation
Week 6	M 2/28 W 3/02	Lecture topic: CMF - color Due: A3.4 Color Assigned: A3.5 Activity: Discussion 1: Color strategies and trends
Week 7	M 3/07 W 3/09	Lecture topic: Advanced high-volume manufacturing (textiles, smart fabrics, etc.) Due: A3.5 Assigned: A3.6 Activity: Discussion 6
Week 8	M 3/14 W 3/16	Lecture topic: 3D scanning and CAD manipulation Due: A3.6a Activity: Discussion 7
Week 9	M 3/21 W 3/23	Lecture topic: 3D scanning and CAD manipulation Activity: presentations Due: A3.6a
Week 10	3/28-4/01	Spring Break
Week 11	M 4/04 W 4/06	Lecture topic: TBD Rhino/Grasshopper introduction Assigned: TBD (check Canvas) Activity: TBD (based on guest lecture)

Week 12	M 4/11 W 4/13	Lecture: TBD experimental module Assigned: explore Rhino Activity: Discussion 10
Week 13	M 4/18 W 4/20	Lecture: TBD experimental module check-in Assigned: progress toward your low-volume design product Activity: Discussion 11 (post progress of your work and discuss)
Week 14	M 4/25 W 4/27	Robot workshop
Week 15	M 5/02 W 5/04	Lecture: Assigned: progress toward your low-volume design product Activity: Discussion 12 (post progress of your work and discuss)
Week 16	M 5/09 W 5/11	Work Day / Simulation using VR; building in interaction Assigned: Finalize your low-volume design product Activity: Discussion 13 (post progress of your work and discuss)
Week 17	M 5/16 W 5/18	Work Day / VR sketching (TBD 3 volunteers for voluntary module) Activity: Discussion 14 (post progress of your work and discuss)
Final Exam	M 5/24 12:15-2:30 pm	<i>Final Exam: submit your workbook and final to canvas following instructions</i>