

Viterbi

AME 546 Design for Manufacturing and Assembly

Units: 4

Instructor: SK Gupta

Office: OHE 400D

Office Hours: Thursday 1 to 2:30 PM

Contact Info: Email: guptask@usc.edu; Phone: 213-740-0431

Course Description

The objective of this course is to present an overview of the methods and tools available for Design for Manufacturing and Assembly (DFMA). DFMA provides a systematic procedure for analyzing a proposed design from the point of view of assembly and manufacture and help in reducing the product cost. Topics covered in the course include the following:

- Design for Assembly
- Design for Additive Manufacturing
- Design for Machining
- Design for Composites
- Design for Injection Molding
- Design for Casting
- Design for Sheet Metal Forming
- Design for Automation
- Process and Material Selection
- Cost Estimation
- Design for Manufacturing for Emerging Manufacturing Processes
- Process Migration

Intended audience for this course includes product designers, manufacturing engineers, or technical managers who intend to work on product development teams and play a role in manufacturing process selection.

Learning Objectives

After completing this course students should be able to:

- Understand differences and similarities between Design for Manufacturing and Design for Assembly
- Understand and describe how product design influences cost
- Select materials and primary and secondary processes for meeting the design requirements
- Simplify assembly through part minimization and reducing the probability of errors
- Design parts to lower manufacturing costs and reduce the probability of defects during manufacturing

Prerequisite(s): N/A

Co-Requisite (s): NONE

Concurrent Enrollment: NONE

Recommended Preparation: NONE

Technological Proficiency and Hardware/Software Required

The course will be taught using Zoom.

Required Text

- Geoffrey Boothroyd, Peter Dewhurst, Winston A. Knight, *Product Design for Manufacture and Assembly*, Third Edition, CRC Press

References

- Geoffrey Boothroyd. *Assembly Automation and Product Design*, CRC Press, 2005.
- E.B. Magrab. S.K. Gupta, F.P. McCluskey, and P. Sandborn. *Integrated Product and Process Design and Development: The Product Realization Process*. Second Edition, CRC Press, 2009.
- Erik Tempelman, Hugh Shercliff, and Bruno Ninaber van Eyben. *Manufacturing and Design: Understanding the Principles of How Things Are Made*. Butterworth-Heinemann, 2014.
- Michael F. Ashby. *Materials Selection in Mechanical Design*. 5th Edition, Butterworth-Heinemann, 2017.
- Jeffrey W. Herrmann. *Engineering Decision Making and Risk Management*. 1st Edition, Wiley, 2015.
- Gene R. Cogorno. *Geometric Dimensioning and Tolerancing for Mechanical Design*. 2nd Edition, McGraw-Hill Education.

Course Grading: Regular Letter Based Grading

Assignments

- 11 Homeworks (33%)
- 2 Mini Projects (32%)
- 1 Final Project (30%)
- Attendance and Participation (5%)

Assignment Submission Policy

Assignment will be submitted on Blackboard

Additional Policies

Penalty will be applied to late assignments. The full allocated points will be reduced by 10 percentage points for the day after the deadline for the submission of coursework. Score will be reduced by a further 40 percentage points each day if coursework is submitted during the following two days.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.

Provides overall safety to USC community. dps.usc.edu