

Department of Industry & Technology
Millersville University of Pennsylvania

ITEC 445

Design for Manufacturing and Assembly

Hosein Atharifar, PhD, CMfgE



Fall 2010

Course Calendar

ITEC 445-Design for Manufacturing and Assembly (Fall 2010)

Date	Day	Topic	TB Chapter	Project	
Aug. 31	Tu	Background and basic concepts-Video 1	TB2- Ch 1,2	1. Select a product that has min. 8 parts, dissect the product, report the parts, materials, and their general DFMA principles	Design Project
Sep. 02	Th	DFMA/DFX approaches and basic principles	TB2-Ch 3,4		
Sep. 07	Tu	Managing DFMA/DFX-Video 2	TB2-Ch5,6,7		
Sep. 09	Th		TB2-Ch8,9,10,11		
Sep. 14	Tu	Materials-ferrous	TB1-Section 2		
Sep. 16	Th	Materials-non ferrous			
Sep. 21	Tu	Design for assembly (DFA)	TB1-Section 7	2. Report design requirements (for example: function, quality, reliability, safety, ergonomic, environmental and user friendliness)	
Sep. 23	Th				
Sep. 28	Tu	Designing parts for forming processes	TB1-Section 3		
Sep. 30	Th				
Oct. 05	Tu				
Oct. 07	Th	Midterm exam			
Oct. 12	Tu	Fall break			
Oct. 14	Th	Designing parts for machining processes	TB1-Section 4	3. Conceptual design (ideation, sketching and rendering)	
Oct. 19	Tu				
Oct. 21	Th				
Oct. 26	Tu	Designing parts for casting processes	TB1-Section 5		
Oct. 28	Th	Working on the design project in the CADD Lab		4. Concise design of parts and assembly for the best conceptual idea in a CADD software (AutoCAD, SolidWorks, Inventor, etc)-DFMA and DFX principles should be applied to the new design of the product. The materials and manufacturing processes for each part should be listed in the Bill of Materials (BOM). The challenge is how much you can reduce the "life-cycle cost" of the product by applying DFMA and DFX principles early in the design process.	
Nov. 2	Tu	Designing parts for nonmetallic mfg. processes	TB1-Section 6		
Nov. 4	Th				
Nov. 9	Tu				
Nov. 11	Th	Working on the design project in the CADD Lab			
Nov. 16	Tu	1. Design for Higher Quality 2. Design for Reliability 3. Designing for Serviceability/Maintainability	Students' presentation (30 minutes each); some materials are provided.		
Nov. 18	Th	4. Designing for Safety 5. Designing for the Environment 6. Designing for User-Friendliness			
Nov. 23	Tu	7. Designing for Short Time to Market 8. DFX in Electronics 9. DFX for Low-Quantity Production			
Nov. 25	Th	Thanksgiving Holiday			
Nov. 30	Tu	Working on the design project in the CADD Lab			
Dec. 2	Th	Designing parts for finishing processes	TB1-Section 8		
Dec. 7	Tu				
Dec. 9	Th	Presentation of "Design Projects" and submitting the final report			
Dec. 14	Tu	NO CLASS			
Dec. 15	Wed	Final exam-Wednesday, Dec. 15-2:45-4:45pm-Check registrar's office for any changes			

Notes: 1. Short paper HWs will be assigned in the class.
2. Instructor preserves the rights to change the course calendar.

Time: Tu-Th 10 am-12:05 pm

Location: Osburn hall, room # TBA

Instructor: Hosein Atharifar, office number 320 at Osburn hall

Office hours: MW 10 am-11:30 pm and Tu-Th 4-5 pm

Contact: (717) 872-3328; hatharifar@millersville.edu; web site: <http://www.millersville.edu/~hatharifar/>

Millersville University

Department of Industry and Technology

Design for Manufacturing and Assembly (DFMA) – ITEC 445, 3 credit hours

PREREQUISITES: Drafting Communications, 3-D CAD knowledge

INSTRUCTOR: Hosein Atharifar

CONTACT: office #320 at Osburn hall; hatharifar@millersville.edu; (717) 872-3328

TEXT BOOKS

1. **(required)** “Design for Manufacturing Handbook”, by James G. Bralla, publisher: McGraw Hill Professional, 2nd Ed., 1998, ISBN-10: 007007139X or ISBN-13: 978-0070071391
2. “Design for Excellence”, by James G. Bralla, publisher: McGraw Hill Professional, 1995, ISBN-10: 0070071381 or ISBN-13: 978-0070071384.

RECOMMENDED REFERENCES

1. “Design for Manufacturability & Concurrent Engineering”, by David M. Anderson, publisher: C I M Pr, 2010, ISBN-10: 1878072234 or ISBN-13: 978-1878072238
2. “Product Design for Manufacturing & Assembly”, by Geoffrey Boothroyd et al., publisher: CRC, 2nd ed., 2001, ISBN-10: 082470584X or ISBN-13: 978-0824705848
3. “Product Design and Development”, by Karl Ulrich and Steven Eppinger, publisher: McGraw-Hill/Irwin, 4th ed., 2007, ISBN-10: 0073101427 or ISBN-13: 978-0073101422

CATALOG DESCRIPTION

Design for manufacturing and assembly is methodologies and tools to define product development phases. It provides experience of working in teams to design high-quality competitive products. Primary goals are to improve ability to reason about design, material and process alternatives and apply modeling techniques appropriate for different development phases. Topics covered are general principles of design for manufacturing and design for assembly, managing DFMA, evaluating different design proposals, economical use of raw materials, design recommendations for various manufacturing processes, designing for quality, designing for safety, designing for serviceability/maintainability, designing for environment, and designing for low-quantity production.

OBJECTIVES

As a result of this course student will:

1. Understand the basic principles of design for manufacturing
2. Understand the basic principles of design for assembly
3. Develop a deep understanding of major manufacturing processes
4. Describe design principles for various manufacturing processes
5. Apply DFMA knowledge-based method in a design and manufacturing firm
6. Analyze different design proposals
7. Apply “Design for X” principles when designing a product
8. Obtain competitive experience in mechanical product designs through class projects
9. Demonstrate a basic working experience of software used in the design for manufacturing and assembly
10. Identify careers and opportunities in design and manufacturing due to technological advancement.

GRADING POLICY

		Points
1. Design project assignments		Project Total 400
○ Product Dissection		50
○ Design Requirements		50
○ Concept Design		50
○ Accurate CADD design		100
○ Parts and Assembly Improvements (DFMA)		25
○ DFX principles		25
○ Presentation		25
○ Final report		75
2. Class attendance and participations		50
3. Homework: short papers		75
4. DFX presentations		50
5. Midterm exam		200
6. Final exam		225
Total Grade		1000 (1000/10=100 max. grade)

GRADING SCALE

<u>Grade</u>	<u>Percent</u>	<u>Grade</u>	<u>Percent</u>
A	≥ 94	C	73 – 76.9
A-	90 – 93.9	C-	70 – 72.9
B+	87 – 89.9	D+	67 – 69.9
B	83 – 86.9	D	63 – 66.9
B-	80 – 82.9	D-	60 – 62.9
C+	77 – 79.9	F	< 60

CLASS ATTENDANCE POLICY

Students are expected to attend all classes. It is the student's responsibility to complete all course requirements even if a class is missed. If a student misses a class for an officially excused reason, then he/she is entitled to make up the missed work but only at the convenience of the faculty member. Responsibility for materials presented in, assignments made for, and tests/quizzes given in regularly scheduled classes lies solely with the student. **Your absence more than three sessions may eliminate you from the class list.**

ACADEMIC DISHONESTY

Academic dishonesty is not tolerated and may result in failure in the course. University's description of academic dishonesty is available at <http://www.millersville.edu/~govern/sect3/acaddis.html>.

MISCELLANEOUS

- Students must check Desire2Learn (<https://millersville.desire2learn.com/>), their marauder e-mail, and <http://www.millersville.edu/~hatharifar/> for announcements, and other course material.
- Failure to take all tests and submit all assignments by the required deadlines invalidates this grading system.
- There is one week allowance to return the homework. Put your name, student number, and course section (e.g. ITEC 445.01). Please return your homework to my office or my mail box.
- There are no make-up exams. Exceptions may be made at my discretion for reasons of illness or university excused absences.
- Students with special needs should contact "Office of Learning Service" at (717) 872-3178, or <http://www.millersville.edu/learningservices/>.
- Cell-phones should be off or be set on vibrate during class in the classroom and the lab.