

Syllabus UM-SJTU JI

Lecture Room: F403 Dong Xia Yuan 东下院
Lecture Meetings: 16:00-17:40 Tue, Thur.

Course Number: VM481
Course Title: Manufacturing Processes
Course Dates: 12 Weeks, May 13- July 31 Summer 2014

Course Description:

Manufacturing processes deal with production methods for converting primary materials into product. Introduction to processing methods with quantitative analysis as applied to fabrication of engineering materials focus on five major categories of forming and shaping processes: solidification, particulate, deformation, material removal and joining. Shaping processes for plastics, polymer matrix composites and rubber technology. Processing of ceramics and cermets for tooling and shaping. Theory and practice of metal machining, operations, machine tools and cutting tool technology. influence of processes on the final mechanical properties of the product. Reconfigurable manufacturing systems (RMS) for rapid process design change in hardware and software to quickly adjust its production. Case studies with design, some cost analysis and limits.

Case Studies: The class will be divided into groups of 2-4 students per group, depending on class size. A set of case studies will be assigned to each group. The topics are designed to be used in conjunction with the video clips located on the publisher's website as well as the book and some on SAKAI. The case studies are listed at the end of this syllabus and detailed descriptions and requirements are shown by SAKAI under "Resources". Each group will be assigned one different case study or a manufacturing process topic as instructed under the case study list by the end of this syllabus. As a group and for each selected topic, you are required to discuss, design, analyze, solve, and submit as a final report and give about 20 minutes PPT presentation (one report & 1PPT due per group during 10th & 11th week). Report & PPT guidelines and schedule of presentations are posted on SAKAI under "Resources". Check SAKAI very often for additional announcements & instructions.

Instructor: Prof. Thomas A. Hamade;
Office: 202 JI Building
Email: Thomas.hamade@sjtu.edu.cn
Office Hours: 12:00PM-1:40 Tue, Thur.
Tel. Office: 021-34207215
TA: Ahmed El-Sied ahmed@sjtu.edu.cn **Tel:** 18818276384

Teaching Material: ***** Recent USA editions preferred but other recent editions OK *****

Electronic version of: Fundamentals of Modern Manufacturing: Materials, Processes, and Systems,
Mikell P. Groover, USA ISBN: **978-1-118-54416-7** (5th Edition) Sept. 2012.
http://www.coursesmart.com/IR/5808987/9781118231463?_hdv=6.8
ASIA paper copy ISBN: **978-1-118-47420-4** (5th Edition) 2013, or 978-1-118-231463

Tests & Final Exam: One extensive midterm test and 1 final exam, each lasts 1 1/2 hours. Tests schedule as shown by this syllabus will be confirmed by the instructor. There will be no make up for any missed test or final exam. All tests are open book but closed notes and only non-programmable calculator is allowed during the tests.

Homework: Homework assignments cover each chapter and due dates are also listed at the end of this syllabus. The homework problems are also shown by SAKAI "Resources". **Students must do all the homework assignments in order to pass each exam (exams often have similar problems to homework).**

Grading Criteria: Maximum worth are shown

One Midterm Test (30% of grade)	300 points
5 Homework Sets (25% of grade, 50points each)	250 points
Case Study (15% of grade)	150 points
Final Examination (30% of grade)	300 points

TOTAL COURSE POINTS: -----
1000 points

COURSE SCHEDULE

See SAKAI for any changes in schedule

Week	Course Lecture Content (US 5 th Ed. 2012 book)	HW & TESTS
1: T 5-13 1: Th 5-15 2: T 5-20 2: Th 5-22	CH1-V1-V4: Introduction & Overview of Manuf. CH10-V: Fundamentals of Metal Casting CH10: continued CH11-V1-V2: Metal Casting Processes CH12: Glassworking	HOMEWORK: 5 assigned homework as shown below
3: T 5-27 3: Th 5-29 4: T 6-3 4: Th 6-5	CH13-V1-V4: Shaping Processes for Plastics CH13: continued CH14-V1-V2: Proc. Polymer Matrix Composites & Rubber CH15-V: Powder Metallurgy	<u>HW1 DUE: CH1, CH10, CH11, CH12</u>
5: T 6-10 5: Th 6-12 6: T 6-17 6: Th 6-19	CH16-V: Processing of Ceramics & Cermets CH17: Fundamentals of Metal Forming CH18-V: Bulk Deformation Proc. in Metal Working CH18: continued Midterm test review CH19-V1-V2: Sheet Metalworking	<u>HW2 DUE: CH13, CH14, CH15, CH16</u>
7: T 6-24 7: Th 6-26 8: T 7-1 8: Th 7-3	CH19: continued CH20-V1-V3: Theory of Metal Machining <u>MIDTERM TEST: CH1,10,11,12,13,14,15,16,17,18</u> CH20: Continued CH21-V1-V4: Machining Operations & Machine Tools CH22-V1-V4: Cutting-Tool Technology	“Location & time test: Announced on SAKAI” <u>HW3 DUE: CH17, CH18, CH19</u>
9: T 7-8 9: Th 7-10 10: T 7-15 10: T 7-15 10: Th 7-17	CH28: Fundamentals of Welding Ch28: continue CH29-V: Welding Processes CH30: Brazing, Soldering and Adhesive Bonding REVIEW FINAL EXAM <u>Special Topic:</u> Reconfigurable Manuf. Systems (RMS) START Group Presentations: Case studies Group 9	<u>HW4 DUE: CH20, CH21, CH22</u>
11: T 7-22 11: Th 7-24	Group Presentations: Case studies Groups 1-6 Group Presentations: Case Studies Groups 7,8, 10-12	<u>HW5 DUE: CH28, CH29, CH30</u> <u>CASE STUDIS REPORTS DUE</u>
12: T 7-29	<u>Final Exam: CH 19, 20,21,22,28,29,30 & 1 Problem CH18 ROLLING</u>	<u>FINAL EXAM:</u> See SAKAI exam schedule & location announcement

CHAPTERS' CROSS REFERENCE BETWEEN TEXTBOOK EDITIONS (5TH US ed. 2012, and 5th ASIA ed. book 2013, 3RD US ed. 2007).

US 5 th ed & electr. version	1	10	11	12	13	14	15	16	17	18	19	20	21	22	28	29	30
ASIA Book ed.	1	7	8	9	10	11	12	13	14	15	16	17	18	19	25	26	27
US 3 rd ed	1	10	11	12	13	14&15	16	17	18	19	20	21	22	23	30	31	32
HW#	1	1	1	1	2	2	2	2	3	3	3	4	4	4	5	5	5

TO ORDER ELECTRONIC VERSION BOOK COURSEMART CLICK:
http://www.coursesmart.com/IR/5808987/9781118231463?_hdv=6.8

List of Case Studies: Each student group will be assigned one different topic from case studies below & alternating. Other topics may be changed by instructor to include: any skipped USA textbook chapter (only CH23-CH27, CH31-CH40), or any approved advanced manufacturing process, or design/manufacture materials in JI laboratories.

Check SAKAI for your group and the group assigned case study. Each case study description and design questions/requirements are detailed on SAKAI. Report & PPT guidelines are also shown on SAKAI. **PPT's group presentations start on Thursday July 17 as scheduled on SAKAI and reports due Thursday July 24, on the 11th week.** You are encouraged to choose case numbers not covered by lectures

- CASE1. BLOW MOLDING: AARON AT BLADE PLASTICS
- CASE2. COMPOSITE PROCESSING: RESIN TRANSFER MOLDING IN THE N.E.
- CASE3. COMPUTER NUMERICAL CONTROL: SONIC BOOM GUITAR MAKER
- CASE4. DIE CASTING: CABOT DIE CASTING COMPANY DONATES WHEELS
- CASE5. ELECTRIC DISCHARGE MACHINING (EDM): ACCESSORIES FOR BICYCLES
- CASE6. FORGING: TIGHT SQUEEZ FORGING OF BONE REPLACEMENT PARTS
- CASE7. GEARS & GEARS CUTTING: GEAR SUPPLIER FOR MEDICAL EQUIPMENT
- CASE8. GRINDING: RYAN'S INTERNSHIP ON A SURFACE GRINDER
- CASE9. HEAT TREATMENT: DEFECTIVE BOLTS FOR HATCHBACK WAGON
- CASE10. DRILLING & HOLEMAKING: 18 HOLES IN AN ENGINE BLOCK
- CASE11. INJECTION MOLDING: AWESOME AMPS & ITS AMPLIFIER O-FRAME
- CASE12. MEASUREMENT & GAGING: DREW & MARIA FASTENERS
- CASE13. MILLING & MACHINING CENTER: RAPIDMOLD TOOL & DIE CO
- CASE14. PLASTICS FINISHING: PHIL INVENTS A FLUSHER
- CASE15. POWDER METALURGY & CERAMICS PROCESSING: BRICK MANUFACTURING
- CASE16. CASTING: KEVIN WORKING IN DETROIT
- CASE17. SHEET METAL SHEARING & BENDING: BENNIE'S STEEL ENCLOSURES
- CASE18. SHEET METAL STAMPING DIES & PROCESSING: DRAWING BRASS CUPS
- CASE19. TURNING & LATHE BASICS: TURBO TURBINES CUTS MOTOR SHAFTS
- CASE20. WELDING: STEEL WALL SUPPORT PANELS IN NORTH CAROLINA
- CASE21. WORKHOLDING INTRODUCTION: A COLLEGE STUDENT IN THE MACHINE SHOP

Homework Assignments: Due dates are to be confirmed by lecturer.

ON EXAMS EXPECT SIMILAR & DIFFERENT QUESTIONS THAN ASSIGNED.

[CHAPTER & PROBLEM NUMBERS CORRESPONDS TO USING USA 5th EDITION BOOK](#)

- HW1 (Due Thur May 29).** CH1: 1, 4, 6, 8
CH10: 1, 3, 4, 10, 13, 14, 15, 20
Ch11: 1, 6, 9, 13
CH12: 3, 9, 12
- HW2 (Due Thur June 12).** CH13: 1, 4, 6, 11, 16, 22
CH14: 4, 10, 14, 20, 25
CH15: 1, 5, 7, 10, 11, 12, 13
CH16: 3, 7, 11, 16
- HW3 (Due Tue July 1).** CH17: 1, 2, 5, 9, 11, 14
CH18: 1, 3, 7, 17, 19, 21, 23, 33, 36
CH19: 1, 3, 7, 9, 15, 17, 19, 25, 34
- HW4 (Due Thur July 10).** CH20: 11, 5, 9, 10, 11, 12, 14, 19, 22, 25, 32, 37
CH21: 1, 2, 10, 14, 15, 21, 23
CH22: 1, 3, 5, 15, 17, 21, 28, 30
- HW5 (Due Thur July 24).** CH28: 1, 2, 5, 8, 10, 12, 14, 16
CH29: 1, 4, 12, 17, 20
CH30: Do any five problems of 1, 3, 7, 9, 10, 12, 16, 20, 24