FOUNDATIONS OF MANUFACTURING TECHNOLOGY

Course code	*FUN126*
Course title	*Foundations of manufacturing technology*
Type of course	*Compulsory*
Stage of study	*Undergraduate*
Year of study	*Second*
Semester	*Fall*
ECTS	*6; 24 hours of theory and 24 hours of practice in classroom, 2 hours of examination,* **112 hours of self-study**
Coordinating lecturer	*Edward Dunbar*
Study form	*Full time*
Course prerequisites	*-*
Language of instruction	*English*

Course description

Engineering fundamentals are essential competence for managers in industry. The course covers necessary engineering knowledge of production process and particular manufacturing operations. After this course students will be able to understand, describe, analyze and select appropriate technology for manufacturing. The course also will familiarize with the conventional manufacturing processes such as metal cutting, stamping, welding, casting and metal adding processes. Course will deliver a knowledge about processing order in technological process.
Course aim
The purpose of this course is to provide an overall introduction and review of manufacturing processes, used equipment, and operation process capabilities, with a strong emphasis on product design, material, process, and equipment selection.

Learning outcomes

Course learning outcomes (CLO)	Study methods	Assessment of learning outcomes
1. To understand and describe **main manufacturing process** using mechanic and non- mechanic technology.	Lecture, discussions, case analysis, role plays, debates, simulations, independent studies	Final exam, midterm, presentation, examination
2. Be able to analyze different technologies, their technical and economic aspects and to **choose right technology** to achieve set characteristics of a product.	Lecture, discussions, case analysis, role plays, debates, simulations, independent studies	Final exam, midterm, presentation, examination
3. To describe the main **principles of mechanization of production** and to estimate its feasibility.	Lecture, discussions, case analysis, role plays, debates, simulations, independent studies	Final exam, midterm, presentation, examination
4. To understand and describe how end products are **stored**, **transported**, to estimate technical and **economic** influence of those processes to product **quality** and price.	Lecture, discussions, case analysis, role plays, debates, simulations, independent studies	Final exam, midterm, presentation, examination

Quality assurance issues

Current structure of the course reflects regular student feedback that is highly appreciated and collected both formally (after completing the course) and informally (during the course). The variety of learning methods used in the course assumes regular check-ups including student presentations during workshops, as well as 3 interim group project evaluations at the course milestones allowing for student guidance regarding the individual learning progress.

Cheating prevention

Teaching and testing methods of the course favor learning and creativity as opposed to cheating. The university regulations on academic ethics are fully applied in the course.

Course content

Week	Topic	Contact hours		Readings
		Theory	Practice	
1.	Introduction to Manufacturing / Materials	2	2	[5] [2] [1]
2.	Casting Processes	2	2	[5] [8]
3.	Plastic and Composite Processing	2	2	[5] [8]
4.	Forming Processing	2	2	[5] [8]
5.	Machining Processes	2	2	[5] [8]
6.	Midterm exam	2	2	
7.	Non-Mechanical Processing / Non Traditional Machining	2	2	[1] [5] [4]
8.	Surface Processing operations	2	2	[5]
9.	Heat Treatment of Metals	2	2	[5] [8]
10.	Rapid Prototyping	2	2	[5] [8]
11.	LEAN Manufacturing / Assembly / Warehousing / Quality	2	2	[5]
12.	Robotics	2	2	
	Total:	24	24	
Exam session	**Final exam**	2		

Self-study and assessment

Assignment	Topics	Number of self-study hours	Percentage of the total grade,%
Homework 1 (REPORT / PRESENTATION)	1 – 4	6	10
Homework 2	5 – 9	6	10
Midterm exam	1 – 5	50	40
Final exam	7 – 12	50	40
Total:		**112**	**100**

Assignments

Homework 1 is intended to classical industrial technology and contains task for given product analysis. Homework should contain explanatory notes (minimum 4 pages) and graphics (1-2 pages).
Homework 2 covers modern industrial technology and contains task for desired product technology analysis. Homework should contain explanatory notes (minimum 4 pages) and graphics (1-2 pages).
Midterm exam covers first five topics of lectures and will be taken in the form of open questions. Duration of exam is 2 academic hours and contains 3 questions of similar value. No additional materials are allowed.

Final exam covers topics after the midterm exam (7-12) and will be taken in the form of open questions. Duration of exam is 2 academic hours and contains 3 questions of similar value. No additional materials are allowed.
Postponing of homework assignments and exams is impossible, and explicit retake of any homework or midterm exam will not be allowed.
In case of the negative final evaluation, exam **retake** is possible, topics will cover the material of the whole course and will comprise **80%** of the final mark. Marks earned during the semester will be added. Structure of the retake is the same as of exam.
Precision of composite evaluations is left intact (up to 2 decimal places) until the end of semester and only the final evaluation will be subject to rounding.

Course books
Main:
[1] Kalpakjian, S., Schmid, S. R., & Vijai Sekar, K. S. (2014). Manufacturing engineering and technology. Singapore: Pearson.

[2] SINGH, Rajender. Introduction to Basic Manufacturing Processes and Workshop Technology, (2006). New Age International Pvt. Ltd.

[3] Mueller, Bernhard. "Additive manufacturing technologies–Rapid prototyping to direct digital manufacturing." Assembly Automation 32.2 (2012).

[4] Gibson, I., D. Rosen, and B. Stucker. "Additive manufacturing technologies, 3D printing, rapid prototyping, and direct digital manufacturing, Springer." New York Heidelberg Dordrecht London (2010).

[5] Groover, Mikell P. Fundamentals of modern manufacturing: materials processes, and systems. John Wiley & Sons, 2010, 4th Edition.

[6] Waters, T. Frederick. Fundamentals of manufacturing for engineers. CRC Press, 2002

[7] Vertut, Jean, ed. Teleoperation and robotics: applications and technology. Vol. 3. Springer Science & Business Media, 2013.

[8] Swift K.G., Booker J.D., Process Selection From Design to Manufacture, Butterworth-Heinemann, 2003

Additional:
Automation, Production Systems, and Computer-Integrated Manufacturing: Pearson New International Edition, 3/E
Groover
©2013 | **Pearson** | Published: 29 Jul 2013
ISBN-10: 1292025921 | ISBN-13: 9781292025926
Computer-Aided Manufacturing, 3/E
Chang, Wysk & Wang
©2006 | **Prentice Hall** | Published: 03 Aug 2005
ISBN-10: 0131429191 | ISBN-13: 9780131429192
Managing Engineering and Technology, International Edition, 6/E
Morse & Babcock
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