



Manufacturing Engineering

Bachelor's Degree in Industrial Technologies Engineering



Syllabus Course outline

Área de Ingeniería de los Procesos de Fabricación
Departamento de Ingeniería Civil, de Materiales y Fabricación
Escuela de Ingenierías Industriales
Universidad de Málaga

Lecturer: D. Francisco Javier Trujillo Vilches
Academic year: 2023-2024 (First Semester)



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1. Course Basic Information

- **Name:** Manufacturing Engineering (Group C, English)
- **Type:** Mandatory
- **ECTS credits:** 6.0
- **Year:** 2 (Third Semester)
- **Campus virtual:** Ingeniería de Fabricación (2023-24, Grado en Ingeniería de la Energía. Plan 2011 Grupo C, Grado en Ingeniería Electrónica, Robótica y Mecatrónica. Plan 2011 Grupo C y Grado en Ingeniería en Tecnologías Industriales. Plan 2010 Grupo C)

<https://eii.cv.uma.es/course/view.php?id=4323>

If you have problems enrolling in the course (campus virtual), please send me an email (trujillov@uma.es). I will enroll you manually

2. Lecturer Basic Information

- **Name:** Francisco Javier Trujillo Vilches
 - PhD Mechanical Engineering
- **Field of Knowledge:** Manufacturing Engineering
- **Department:** Ingeniería Civil, de Materiales y Fabricación
- **Office:** 2.038 D
- **e-mail:** trujillov@uma.es
- **Phone:** 951 952 245
- **Office hours**
 - Tuesday: 9:30 – 11:00 h; 11.30 – 13.00 h
 - Wednesday: 9:30 – 11:00 h
 - Thursday: 11.30 – 13.00 h



3. Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00-9:30	IF GITI (C)				
9:30-11:00	IF GITI (C)	Office hours	Office hours		
11:30-13:00		Office hours	IF GITI (C)	Office hours	
13:00-14:30				IF GITI (C)	

- Lectures → Room 1.24
- Office Hours → Office 2.038 D

3. Schedule

Planning

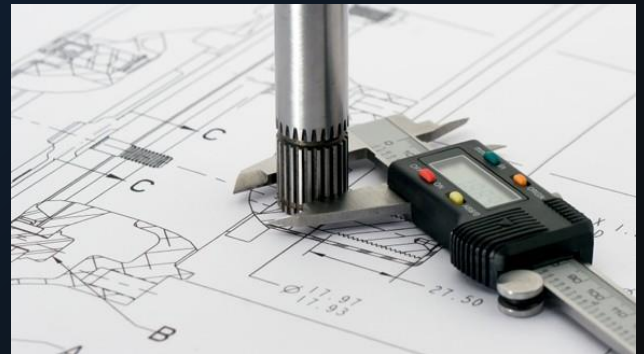
IF - GITI - C (English)								
WEEK	1	2	3	4	5	6	7	8
First Day of the Week	11-Sep	18-Sep	25-Sep	2-Oct	9-Oct	16-Oct	23-Oct	30-Oct
Monday 08:00 - 09:30				W1-G3			T1	W2-G3
Monday 09:30 - 11:00		L	L	W1-G1	W1-G2	L	L	W2-G1
Wednesday 11:30 - 13:00	L	L	L	L	L	L	L	Holiday
Thursday 13:00 - 14:30	L	L	L	L	Holiday	L	TW1	L

IF - GITI - C (English)								
WEEK	9	10	11	12	13	14	15	
First Day of the Week	6-Nov	13-Nov	20-Nov	27-Nov	4-Dec	11-Dec	18-Dec	
Monday 08:00 - 09:30		W3-G3		T2	W4-G3	L	TW3	
Monday 09:30 - 11:00	W2-G2	W3-G1	W3-G2	L	W4-G1	W4-G2	TW4	
Wednesday 11:30 - 13:00	L	L	L	L	Holiday	L	TW5	
Thursday 13:00 - 14:30	L	L	L	TW2		L	T3	

L	Lectures	Room 1.24
W	Workshops	W1, W3 and W4 --> Workshop 25 (Workshops Building); W2 --> 0.532-L, Main Building - Ground floor
T	Test	Computer room 3
TW	Team Work	Room 1.24
Holiday	Holiday	

4. Issues

- Learning:
 - Manufacturing Processes
 - Machinery and Tooling
 - Process Automation
 - Metrology and Quality Control
 - Manufacturing and Environment
 - Processes **performance**: 4 viewpoints (functional, economical, energetic and environmental)



5. Content Description

Basic content

- **Section 1.** Introduction and overview of Manufacturing Engineering
- **Section 2.** Metal casting and Powder Metallurgy
- **Section 3.** Polymers and Composites forming
- **Section 4.** Metal Forming
- **Section 5.** Machining
- **Section 6.** Welding
- **Section 7.** Manufacturing Systems. Automation
- **Section 8.** Metrology and Quality
- **Section 9.** Manufacturing and Environment

5. Content Description

Extended content

Section (S)	Chapter (Ch)
S1. Introduction and overview of Manufacturing	Ch1.1. Introduction to Manufacturing Processes Ch1.2. Materials and manufacturing processes selection
S2. Metal casting and Powder Metallurgy	Ch2.1. Fundamentals of Metal Casting Ch2.2. Melting Furnaces Ch2.3. Sand Casting Ch2.4. Die Casting and Special Casting Processes Ch2.5. Powder Metallurgy
S3. Polymers and Composites Forming	Ch3.1. Polymers Forming Ch3.2. Composites Forming
S4. Metal Forming	Ch4.1. Introduction to Metal Forming Ch4.2. Bulk Deformation Processes in Metal Working Ch4.3. Sheet Metal Working

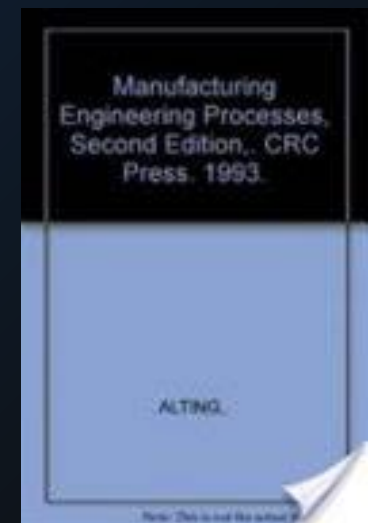
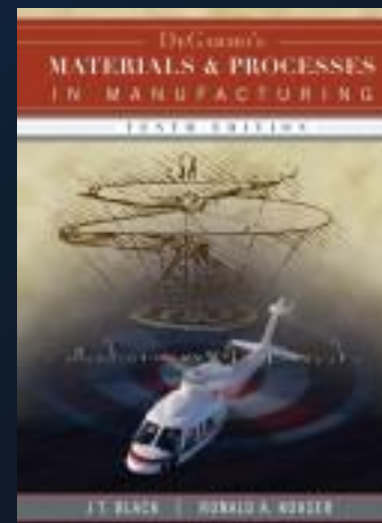
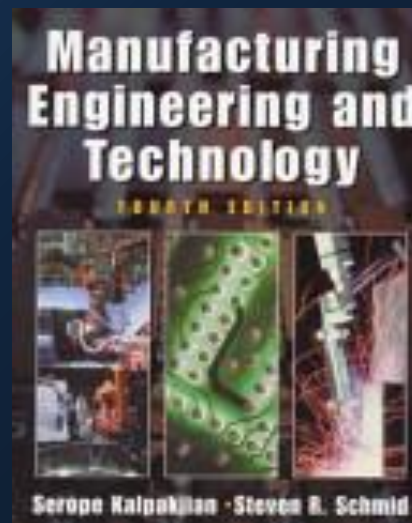
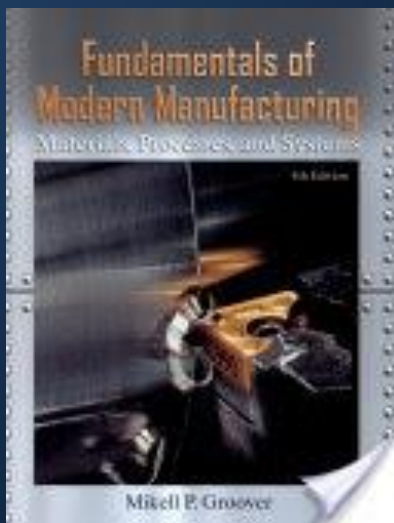
5. Content Description

Extended content

Section (S)	Chapter (Ch)
S5. Machining	Ch5.1. Theory of Metal Machining Ch5.2. Traditional Machining Processes Ch5.3. Nontraditional Machining Processes
S6. Welding	Ch6.1. Fundamentals of Welding Ch6.2. Welding Processes
S7. Manufacturing Systems. Automation	Ch7.1. Organization and Planning of Manufacturing Systems Ch7.2. Manufacturing Automation
S8. Metrology and Quality Control	Ch8.1. Introduction to Metrology Ch8.2. Introduction to Quality Control
S9. Manufacturing and Environment	Ch9.1. Manufacturing and Environment

6. Booklist

- M. P. **Groover**, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems: John Wiley & Sons, 2010.
- S. **Kalpakjian** and S. R. Schmid, Manufacturing Engineering and Technology: Prentice Hall, 2001.
- J. T. Black, E. P. DeGarmo, and R. A. Kohser, **DeGarmo's** materials and processes in manufacturing: Wiley, 2007.
- L. **Alting**, Manufacturing Engineering Processes, Second Edition: Taylor & Francis, 1993.



7. Workshops

- Objectives: To familiarize students with some of the manufacturing processes exposed in theoretical classes (machinery and tooling, operations, applications, etc.)



P1. Sand Casting (1.5 h)

It aims to familiarize students with the process of sand casting, the elements involved, and the process used to manufacture a single piece by this procedure.

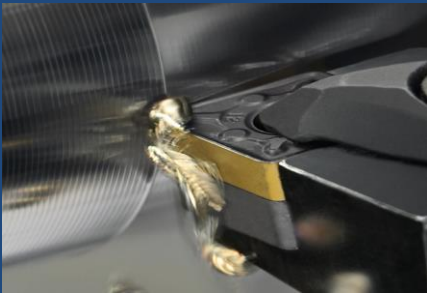


P2. Welding (1.5 h)

It aims to familiarize students with the main welding procedures and equipment used in the industry: Shielded Metal Arc Welding (SMAW), Metal Inert Gas Welding (MIG), Metal Active Gas Welding (MAG), Tungsten Inert Gas Welding (TIG), Oxyacetylene Welding, Resistance Welding, etc.

7. Workshops

- Objectives: To familiarize students with some of the manufacturing processes exposed in theoretical classes (machinery and tooling, operations, applications, etc.) → **In-person attendance**



P3. Machining (1.5 h)

It aims to familiarize students with the most commonly used machining processes (turning, milling and drilling), learning to identify different machine tools, the main cutting movements and the tools used (material and geometry).



P4. Metrology (1.5 h)

It aims to familiarize students with the working environment in a Metrology Laboratory, as well as learning to manage length and angle measuring instruments (by direct and indirect methods), such as Vernier Caliper, Micrometer, Goniometer or Dial Gauge.

7. Workshops

Workshops Schedule

		Group	Date	Hour	Place
W1	Sand Casting	G1	Monday 02/10/2023	9:30 - 11:00 h	Workshop 25 (Workshops Building)
		G2	Monday 09/10/2023	9:30 - 11:00 h	
		G3	Monday 02/10/2023	8:00 – 9:30 h	
W2	Welding	G1	Monday 30/10/2023	9:30 - 11:00 h	0.532-L, Main Building - Ground floor
		G2	Monday 06/11/2023	9:30 - 11:00 h	
		G3	Monday 30/10/2023	8:00 – 9:30 h	
W3	Machining	G1	Monday 13/11/2023	9:30 - 11:00 h	Workshop 25 (Workshops Building)
		G2	Monday 20/11/2023	9:30 - 11:00 h	
		G3	Monday 13/11/2023	8:00 – 9:30 h	
W4	Metrology	G1	Monday 04/12/2023	9:30 - 11:00 h	Workshop 25 (Workshops Building)
		G2	Monday 11/12/2023	9:30 - 11:00 h	
		G3	Monday 04/12/2023	8:00 – 9:30 h	

8. Teaching Methodology

A. LECTURES

- *The theoretical contents will be provided in English and Spanish (slideshows in English and full chapters in Spanish)*

B. Workshops

- *Practical lessons guides will be provided in English*

C. STUDENT PERSONAL WORK

D. TEAM WORK

- *Groups of up to 5 students will develop a work devoted to a specific manufacturing process. Each group will deliver a final report and will make a presentation in class*

E. FINAL EXAM

8. Teaching Methodology

Ingeniería de Fabricación (2023-24, Grado en Ingeniería de la Energía. Plan 2011 Grupo C, Grado en Ingeniería Electrónica, Robótica y Mecatrónica. Plan 2011 Grupo C y Grado en Ingeniería en Tecnologías Industriales. Plan 2010 Grupo C)

Turn editing on



This course is hidden for students.

In order to students can see the course click on "Edit settings" and set "Course visibility" = "Show".

★ **Welcome class**

Useful information

Lectures (Slides in English)

Chapters (Spanish)

Workshops

Team Work

Test

Student opinion survey on teacher performance

Call for Department Council Election

- Lecturer: Francisco Javier Trujillo Vilches
- e-mail: trujillov@uma.es
- Phone: 951 952 245
- Office hours (Room 2.038 D)
 - Tuesday: 9:30 – 11:00 h; 11.30 – 13.00 h
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9. Assessment Methodology

- Continuous evaluation (25%)
 - Team work & individual work (max 10%) (TW)
 - Test (max 10%) (T)
 - Workshops (max 5 %) (W)
 - Attendance to lectures and practical lessons will be controlled by signature sheet
 - All the grades obtained in this set of activities are valid for the present course. However, the attendance to the workshops will be taken into account on the following years
- Final Exam (75%) (FE)

To pass the course:

OPTION A: No final exam is required

OPTION B: Final exam is required

9. Assessment Methodology

To pass the course:

OPTION A: (no final exam is required)

The following conditions must be met simultaneously:

1. *Each Test grade (T1, T2 and T3) ≥ 4.5*
2. *Test average grade (T) ≥ 5*
3. *Delivery of Teamwork is mandatory*
4. *Final average grade ≥ 5*

The final average grade (FG) is calculated as follows:

$$FG = 0.85 \cdot T + 0.10 TW + 0.05 W$$

TW, T, W \rightarrow Maximum score \rightarrow 10 points

9. Assessment Methodology

OPTION B: (final exam is required)

- **Any Test** grade (T1, T2 and T3) < 4.5
- **Test** average grade < 5
- **Team Work** not delivered

To pass the course:

The following conditions must be met simultaneously:

1. **Final Exam** average grade ≥ 5
2. **Final average grade** ≥ 5

The final average grade (FG) is calculated as follows:

$$FG = 0.75 \cdot FE + 0.10 \cdot T + 0.10 TW + 0.05 W$$

TW, T, W, FE \rightarrow Maximum score \rightarrow 10 points



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