



BENHA UNIVERSITY



FACULTY OF ENGINEERING AT SHOUBRA

COURSE SPECIFICATIONS (2014-2015)

Model No.12

Course Specifications: Powder Metallurgy

University: Benha University

Faculty: Faculty of Engineering at Shoubra

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

1- Course Data

Course Code: MDE453

Course Title: Powder Metallurgy

Specialization: production Mechanical Engineering department

Course Type: Elective

Study Year: Fourth Year

Teaching Hours: Lecture: 3

Tutorial: 2

Practical: 0

Total: 5

2- Course Aim

For students undertaking this course, the aims are to:

1. Familiarize the students with the powder metallurgy process/ technique.
2. Understand the different methods of powder production.
3. Describe the compaction and sintering behavior.
4. Understand the different properties of PM products.

3- Intended Learning Outcomes of Course (ILO's)

- a. **Knowledge and Understanding Skills:** On completing this course, students will be able to demonstrate the knowledge and understanding of:
 - a.1) Terminologies used in engineering materials related to powder metallurgy. (A.3).
 - a.2) The basic principles of the Powder Metallurgy Processes, Powder Metallurgy Processes, Powder Shaping, Compaction, Sintering, and heat treatment.(A4)
 - a.3) The operating principles of Design Consideration of P/M product. (A9)
 - a.4) Steps to approach design problem solution (A5).
 - a.5) The Mechanical Behavior, Testing, and Manufacturing Properties of Materials used in P/M products.(A16)
 - a.6) Design steps to approach PLM product. (A19)
- b. **Intellectual Skills:** At the end of this course, the students will be able to:
 - b.1) Assess the differences between the P/M technology and other production technology.(B2)
 - b.2) describe the different production steps to get final P/M product (B.6).
 - b.3) Investigate the failure of components, systems, and processes within P/M technology (B.8).
 - b.4) Create systematic and methodic approaches when dealing with new and advancing/M technology (B.1).
 - b.5) Analyze the quality of the final P/M product (B12).
- c. **Practical and Professional Skills:** On completing this course, the students are expected to be able to:
 - c.1) Create and/or re-design a process, component or system, and carry out specialized engineering designs (C.2).
 - c.2) Exchange knowledge and skills with engineering community and industry (C.1).
 - c.3) Write computer programs pertaining to mechanical power and energy engineering (C.7).



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General and Transferable Skills: At the end of this course, the students will be able to:

- d. 1) Collaborate effectively within multidisciplinary team (D.1).
- d. 1) Work in stressful environment and within constraints (D.2).
- d. 1) Communicate effectively (D.3).

4- Course Contents

Week no.	Topics
1	Powder metallurgy - An overview.
2,3	Introduction to powder metallurgy.
4,5	The Powder Metallurgy Processes
6	Powder Shaping.
8	Compaction.
9,10	Sintering.
11,12,13	PM Properties.
13,14	Design Consideration.

5- Teaching and Learning Methods

- 5.1- Lectures
- 5.2- Class activity
- 5.3- Case study
- 5.4- Assignments / Homework
- 5.5- Presentation of selected topics with written reports.
- 5.6- Pop quizzes.
- 5.7- Field trip

6- Teaching and Learning Methods of Disables

- 6.1- Assignments: Weeks 1-12
- 6.2- Quizzes: Random
- 6.3- 5-wk Exam
- 6.4- Mid-term: wk 7 or 8
- 6.5- Topics Presentation: Weeks 1-12
- 6.6- Final Exam: End of semester.

7- Student Assessment

a- Student Assessment Methods

1. Five Assignments to assess knowledge and intellectual skills.
2. Two quiz to assess knowledge, intellectual and professional skills.
3. Mid-term exam to assess knowledge, intellectual, professional and general skills.
4. Final exam to assess knowledge, intellectual, professional and general skills.

b- Assessment Schedule

NO.	Assessment	Week
1	Assignments	5, 6, 7, 9, 11
2	Quizzes	3, 11
3	Mid-term exam	7
4	Final exam	15



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c- Weighting of Assessments

Assessment	Weight (%)
Mid-Term Examination	18 %
Final-Term Examination	64%
Practical Examination	05 %
Semester work	08 %
Other types of assessment	05 %
Total	100

8- List of References

a- Course Notes: Course notes prepared by instructor. and uploaded online.

b- Recommended Books

- 1- Kalpakjian, S. and Schmid S.R., "Manufacturing Engineering and Technology," 6th Edition, Prentice Hall, 2010.
- 2- Groover, M. P., "Fundamentals of Modern Manufacturing," 3rd Edition, John Wiley & Sons, Inc., 2007.

Course Coordinator: Prof. Dr. Hamdy Mohammed Ali Kandil

Head of Department: Prof. Dr. Osama Ezzat Abdelatif



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COURSE SPECIFICATIONS (2014-2015)

Model No.11A

Course Specifications: Powder Metallurgy

University: Benha University

Faculty: Faculty of Engineering at Shoubra

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

Matrix of Knowledge and Skills of the Course

no.	Topics	Week no.	Knowledge and Understanding Skills	Intellectual Skills	Practical and Professional Skills	General and Transferable Skills
1	Introduction to powder metallurgy	1	a4			
2	The scientific principles of powder metallurgy.	2	a2, a4, a5	b4	c1, c3	d3
3	Powder Manufacture	3	a6	b1, b3	c1, c3	
4	Charge preparation and composition	4	a1, a2, a4, a6	b4	c1, c3	d2, d3
5	Pressing	5	a1, a2, a4, a6	b1, b3	c1, c3	
6	Sintering	6	a2, a4	b4	c1, c3	
7	Hot pressing.	7	a1, a4	b1, b3	c1, c3	d1
8	Midterm exam	8	a1, a4, a5	b4	c1, c3	
9	Other Techniques to produce P/M products	9	a3, a4	b1, b3	c1, c3	d1
10	Secondary Operations.	10	a1, a3, a4	b4	c1, c3	d3
11	Properties of P/M Products.	11	a1	b1, b3	c1, c3	d1, d2
12	Design of P/M parts	12	a1, a4		c1, c3	
13	Powder metallurgy products-1	13	a1, a4	b5	c1, c3	
14	Powder metallurgy products-2	14				
15	Final exam	15				

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Matrix of Course Aims and ILO's

Course Title: Powder Metallurgy

Course Code: MDE453

Teaching Hours: Lecture: 3 Tutorial: 2 Total: 5

Major or minor element of program: Major

Program on which the course is given: B.Sc. Mechanical production Engineering

Department offering the program: Mechanical Engineering Department

Academic year / level: 2014-2015 Fourth Year / First Semester

Date of specifications approval: 2014

Course aims	Basic Knowledge	Intellectual Skills	professional Skills	General Skills
1- To familiarize the students with the powder metallurgy process/ technique.	a1,a3	b2,b4		d1,d3
2-To understand the different methods of powder production.	a1	b1,b3	c2	d1,d2
3-To describe the compaction and sintering behavior.	a2,a4	b2,b4		d1,d3
4-To understand the different properties of PM products.		b3,b4	c3	d3

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