Course Specification

(2026-2027)

1. Basic Information

Course Title (according to the bylaw)	Machine design 2			
Course Code (according to the bylaw)	PDE312			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	14 x 2 h lectures	14 x 3 h practical		
Course Type	Mandatory			
Academic level at which the course is taught	3rd level			
Academic Program	Production Engineering & Mechanical /Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Dr. Ezzat showaib			
Course Specification Approval Date	/9/2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)				

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2. Course Overview (Brief summary of scientific content)

This course aims to:

- Design and selection of bearings, including deep groove ball bearings, angular contact ball bearings, cylindrical bearings, self-aligning bearings, tapered bearings, and journal bearings.
- Help engineers acquire the basic knowledge, skills, and technical requirements necessary for the selection, design, and application of bearings in mechanical machines and industrial equipment.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	LO1	**Identify** the basic principles, types, and applications of bearings used in mechanical systems.
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles	LO2	**Explain** the basic design requirements and criteria for selecting suitable bearings for mechanical applications.

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Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
	and contexts of sustainable design and development.		
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles..	LO3	**Apply** relevant standards and manufacturer catalogs in the selection of appropriate bearings.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	LO4	**Use** bearing catalogs and technical references to obtain the required bearing specifications and characteristics.
B1	Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of Thermodynamics, Heat Transfer, Fluid Mechanics, Solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.	LO5	**Analyze** the loads, operating conditions, and design requirements affecting bearing selection and performance.
B2	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional	LO6	**Select** suitable deep groove ball, angular contact, cylindrical, self-aligning, tapered, and journal bearings for given mechanical applications.

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Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
	means and computer-aided tools and software contemporary to the mechanical engineering field.		
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to design, build, operate, inspect and maintain mechanical equipment and systems.	LO7	**Evaluate** different bearing alternatives based on load capacity, operating conditions, service requirements, and economic considerations.
C1	Apply basic theories to production processes, including new techniques in manufacturing, to select appropriate processes and process standards for specific products	LO8	**Perform** the necessary calculations for bearing selection and basic bearing design.
C2	Design systems, machines, tools and products by applying appropriate standards and developing necessary calculations, construction and operating drawings.		

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4. Teaching and Learning Methods

4.1 Lectures.
4.2 Tutorials.
4.3 Exercise/solved – problem classes.
4.4 Problem sheet assignments.
4.5 Direct reading and independent studies.

Teaching and Learning Facilities

- Computer or laptop and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).
- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

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Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Revision of Stresses	3				
2	Revision of Design of shafts	3				
3	Introduction to bearings	3				
4,5	Bearing selection	3				
6,7	Deep groove ball bearing	3				
8,9	Angular contact ball bearing	3				
10	Cylindrical bearing	3				
11	Self aligning bearing	3				
12	Tapered bearing	3				
13,14	Journal bearing	3				

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects	Weekly		5%
2	Mid Term Exam	8th week		20%
3	Quizzes	4th and 10th week		10%

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4	Reports	3rd,4th,6th,9th and 11st weeks		5%
5	Final exam	As Scheduled	50 Marks	60%
6	Total		175Marks	50%

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	- Shigley, J. E., Budynas, R. G., and Nisbett, K. J., *Shigley's Mechanical Engineering Design*. McGraw-Hill. - Mott, R. L., *Machine Elements in - Mechanical Design*. Pearson.
	Other References	All relevant books and scientific references related to machine element design and bearing selection.
	Electronic Sources (Links must be added)	Egyptian Knowledge Bank: Manufacturer bearing -www.ekb.eg catalogs and technical manuals.
	Learning Platforms (Links must be added)	www.ekb.eg (Egyptian Knowledge Bank)- University learning management system (LMS).
	Other (to be mentioned)	- Manufacturer catalogs, technical data sheets, and bearing selection guides.
Supportive facilities & equipment for teaching and learning *	Devices/Instruments	- Computer and data projector for lectures and technical illustrations.
	Supplies	- Printed bearing catalogs, technical drawings, charts, and instructional materials.

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	Electronic Programs	- Microsoft Excel for bearing selection and design calculations.- CAD software for illustrating bearing arrangements and mechanical assemblies.
	Skill Labs/ Simulators	Mechanical design laboratory equipment and bearing demonstration models, where available.
	Virtual Labs	- Online bearing selection and design resources provided by bearing manufacturers.
	Other (to be mentioned)	- Engineering drawings, bearing samples, and manufacturer technical catalogs.

Name and Signature
Course Coordinator
prof. Ezzat showaib
أ.د عزت شعيب

Name and Signature
Program Coordinator
Prof. Samy asal
أ.د.سامي عسل

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Course Specification

(2026-2027)

1. Basic Information

Course Title (according to the bylaw)	**Machine design 2**			
Course Code (according to the bylaw)	MPD3114			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	14 x 2 h lectures	14 x 3 h practical		
Course Type	Mandatory			
Academic level at which the course is taught	3rd level			
Academic Program	Production Engineering & Mechanical /Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Dr. Ezzat showaib			
Course Specification Approval Date	/9/2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)				

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2. Course Overview (Brief summary of scientific content)

This course aims to:

- Design and selection of bearings, including deep groove ball bearings, angular contact ball bearings, cylindrical bearings, self-aligning bearings, tapered bearings, and journal bearings.
- Help engineers acquire the basic knowledge, skills, and technical requirements necessary for the selection, design, and application of bearings in mechanical machines and industrial equipment.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	LO1	**Identify** the basic principles, types, and applications of bearings used in mechanical systems.
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles	LO2	**Explain** the basic design requirements and criteria for selecting suitable bearings for mechanical applications.

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Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
	and contexts of sustainable design and development.		
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles..	LO3	**Apply** relevant standards and manufacturer catalogs in the selection of appropriate bearings.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	LO4	**Use** bearing catalogs and technical references to obtain the required bearing specifications and characteristics.
B1	Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of Thermodynamics, Heat Transfer, Fluid Mechanics, Solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.	LO5	**Analyze** the loads, operating conditions, and design requirements affecting bearing selection and performance.
B2	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional	LO6	**Select** suitable deep groove ball, angular contact, cylindrical, self-aligning, tapered, and journal bearings for given mechanical applications.

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Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
	means and computer-aided tools and software contemporary to the mechanical engineering field.		
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to design, build, operate, inspect and maintain mechanical equipment and systems.	LO7	**Evaluate** different bearing alternatives based on load capacity, operating conditions, service requirements, and economic considerations.
C1	Apply basic theories to production processes, including new techniques in manufacturing, to select appropriate processes and process standards for specific products	LO8	**Perform** the necessary calculations for bearing selection and basic bearing design.
C2	Design systems, machines, tools and products by applying appropriate standards and developing necessary calculations, construction and operating drawings.		

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4. Teaching and Learning Methods

4.1 Lectures.
4.2 Tutorials.
4.3 Exercise/solved – problem classes.
4.4 Problem sheet assignments.
4.5 Direct reading and independent studies.

Teaching and Learning Facilities

- Computer or laptop and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).
- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

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Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Revision of Stresses	3				
2	Revision of Design of shafts	3				
3	Introduction to bearings	3				
4,5	Bearing selection	3				
6,7	Deep groove ball bearing	3				
8,9	Angular contact ball bearing	3				
10	Cylindrical bearing	3				
11	Self aligning bearing	3				
12	Tapered bearing	3				
13,14	Journal bearing	3				

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects	Weekly		5%
2	Mid Term Exam	8th week		20%
3	Quizzes	4th and 10th week		10%

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4	Reports	3^{rd},4^{th},6^{th},9^{th} and 11^{st} weeks		5%
5	Final exam	As Scheduled	100 Marks	60%
6	Total		175Marks	50%

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	- Shigley, J. E., Budynas, R. G., and Nisbett, K. J., *Shigley's Mechanical Engineering Design*. McGraw-Hill. - Mott, R. L., *Machine Elements in - Mechanical Design*. Pearson.
	Other References	All relevant books and scientific references related to machine element design and bearing selection.
	Electronic Sources (Links must be added)	Egyptian Knowledge Bank: Manufacturer bearing -www.ekb.eg catalogs and technical manuals.
	Learning Platforms (Links must be added)	www.ekb.eg (Egyptian Knowledge Bank)- University learning management system (LMS).
	Other (to be mentioned)	- Manufacturer catalogs, technical data sheets, and bearing selection guides.
Supportive facilities & equipment for teaching and learning *	Devices/Instruments	- Computer and data projector for lectures and technical illustrations.
	Supplies	- Printed bearing catalogs, technical drawings, charts, and instructional materials.

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	Electronic Programs	- Microsoft Excel for bearing selection and design calculations.- CAD software for illustrating bearing arrangements and mechanical assemblies.
	Skill Labs/ Simulators	Mechanical design laboratory equipment and bearing demonstration models, where available.
	Virtual Labs	- Online bearing selection and design resources provided by bearing manufacturers.
	Other (to be mentioned)	- Engineering drawings, bearing samples, and manufacturer technical catalogs.

Name and Signature Course Coordinator prof. Ezzat showaib أ.د عزت شعيب	Name and Signature Program Coordinator Prof. Samy asal أ.د.سامي عسل

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Course Specification

(2026/2027)

1. Basic Information

Course Title (according to the bylaw)	**Engineering Drawing (1)**			
Course Code (according to the bylaw)	PDE 021			
Department/s participating in delivery of the course	Production Engineering and Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	4	--	6
Course Type	اجباري			
Academic level at which the course is taught	**0 Level**			
Academic Program	Production Engineering and Mechanical Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Prof. Samy Assal			
Course Specification Approval Date	**Sep. 2026**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council)	Department council			

2. Course Overview (Brief summary of scientific content)

This course aims to:

- Familiarize the student with different drawing equipment, technical standards and procedures for construction of geometric figures and introduce the fundamentals of engineering drawing.
- build the imagination of the students regarding projection.

- provide students with knowledge and abilities to design a 3D object on *2D* paper by hand sketching method and by means of computer aided design software.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development	LO1	**Analyze** engineering drawings to determine the appropriate projection and geometric construction methods.
		LO2	**Compare** different projection techniques and select the appropriate graphical representation for engineering objects.
		LO3	**Interpret** engineering drawings to visualize three-dimensional objects from two-dimensional views.
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	LO4	**Apply** engineering drawing standards to produce accurate engineering drawings.
		LO5	**Design** orthographic projections and auxiliary views according to standard drawing practices.
		LO6	**Use** engineering drawing instruments and appropriate drawing techniques accurately and safely.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	LO7	**Describe** the principles, standards, and applications of engineering drawing.
		LO8	**Communicate** engineering ideas effectively through graphical representation and technical drawings.
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build,	LO9	**Illustrate** engineering drawing instruments, line types, dimensioning rules, and projection principles.
		LO4	**Apply** engineering drawing standards to produce accurate engineering drawings.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	operate, inspect and maintain mechanical equipment and systems.	**LO6**	**Use** engineering drawing instruments and appropriate drawing techniques accurately and safely.

4. Teaching and Learning Methods

1. Lectures.
2. Tutorials.
3. Exercise/solved – problem classes.
4. Problem sheet assignments.
5. Research skills development.

5. Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments/ Projects/ ...)	**Other** (to be determined)
1	**Introduction to Engineering Drawing, Engineering tools and how to use them**	**6**	**2**	**4**		
2	**Types of Lines and Writing dimensions**	**6**	**2**	**4**		
3	**Types of Lines and Writing dimensions**	**6**	**2**	**4**		
4	**Geometric Operations**	**6**	**2**	**4**		
5	**Geometric Operations**	**6**	**2**	**4**		
6	**Geometric Operations**	**6**	**2**	**4**		
7	**Mong Projection and point projection**	**6**	**2**	**4**		
8	**Mong Projection and point projection**	**6**	**2**	**4**		
9	**Line Projection**	**6**	**2**	**4**		
10	**Line Projection and plan projection**	**6**	**2**	**4**		

11	plan projection	6	2	4		
12	Auxiliary Projection	6	2	4		
13	Auxiliary Projection	6	2	4		
14	Polyhedrons and unfolding	6	2	4		

6. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Assignments	Weekly	25	25%
2	Mid Term Exam	8th week	15	15%
3	Quizzes	4th and 10th weeks	10	10%
4	Final exam	As Scheduled	50	50%

7. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.)	The main (essential) reference for the course (must be written in full according to the scientific documentation method)	• Griffiths, Brian. Engineering drawing for manufacture. Elsevier, 2023 • Agrawal, Basant, and C. M. Agrawal. Engineering Drawing. McGraw Hill Education (India), 2024 • Madsen, David A., and David P. Madsen. Engineering drawing and design. Cengage Learning, 2025
	Other References	All the books and scientific research linked to Engineering drawing
	Electronic Sources (Links must be added)	www.ekb.eg (Egyptian Knowledge Bank
	Learning Platforms	Microsoft team
	Other	Non
Supportive facilities & equipment for teaching and learning	Devices/Instruments	• Computers or laptop and good Internet for hybrid learning. • White board. • Data Show (Power point presentations). • Online Recorded Videos.
	Supplies	Non
	Electronic Programs	Non
	Skill Labs/ Simulators	Non
	Virtual Labs	Non
	Other (to be mentioned)	

Name and Signature Course Coordinator	Name and Signature Program Coordinator
Prof. Samy Assal	Prof. Samy Assal





Course Specification

(2026/2027)

1. Basic Information

Course Title (according to the bylaw)	**Engineering Drawing (2)**			
Course Code (according to the bylaw)	PDE 022			
Department/s participating in delivery of the course	Production Engineering and Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	4	--	6
Course Type	اجباري			
Academic level at which the course is taught	**0 Level**			
Academic Program	Production Engineering and Mechanical Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Prof. Samy Assal			
Course Specification Approval Date	September 2027			
Course Specification Approval (Attach the decision/minutes of the department /committee/council)	Department council			

2. Course Overview (Brief summary of scientific content)

This course aims to:

- build the imagination of the students regarding 3d objects.
- provide students with knowledge and abilities to design a 3D object on 2D paper by hand sketching method and by means of computer aided design software.
- familiarize the student with different steel sections and structures.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development	LO1	**Describe** the principles of orthographic projection, sectional drawing, and isometric representation of engineering objects.
		LO2	**Analyze** engineering drawings to derive missing orthographic views and interpret three-dimensional objects.
		LO3	**Compare** orthographic, isometric, and sectional drawing techniques for engineering applications.
		LO4	**Interpret** engineering drawings to select the appropriate graphical representation of engineering components.
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	LO5	**Design** engineering drawings of simple steel structures using manual drafting and computer-aided drawing tools.
		LO6	**Communicate** engineering concepts effectively through professional engineering drawings and graphical presentations.
		LO7	**Illustrate** engineering drawing standards, symbols, and conventions used in steel construction and computer-aided drafting.
		LO8	**Apply** engineering drawing standards to produce accurate orthographic, sectional, and isometric drawings.
A10	Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.	LO1	**Describe** the principles of orthographic projection, sectional drawing, and isometric representation of engineering objects.
		LO9	**Use** computer-aided drafting tools and engineering drawing instruments to prepare engineering drawings accurately.
		LO6	**Communicate** engineering concepts effectively through professional engineering drawings and graphical presentations.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to design, build, operate, inspect and maintain mechanical equipment and systems.	LO1	**Describe** the principles of orthographic projection, sectional drawing, and isometric representation of engineering objects.
		LO9	**Use** computer-aided drafting tools and engineering drawing instruments to prepare engineering drawings accurately.
		LO4	**Interpret** engineering drawings to select the appropriate graphical representation of engineering components.

4. Teaching and Learning Methods

1. Lectures.
2. Tutorials.
3. Exercise/solved – problem classes.
4. Problem sheet assignments.
5. Research skills development.
6. Direct reading and independent studies

5. Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments/ Projects/ ...)	**Other** (to be determined)
1	**Orthogonal Projection of Bodies**	**6**	**2**	**4**		
2	**Orthogonal Projection of Bodies**	**6**	**2**	**4**		
3	**Orthogonal Projection of Bodies**	**6**	**2**	**4**		
4	**Derivation of the Third View**	**6**	**2**	**4**		
5	**Derivation of the Third View**	**6**	**2**	**4**		

6	**Derivation of the Third View**	**6**	**2**	**4**		
7	**Engineering Isometric Drawing**	**6**	**2**	**4**		
8	**Engineering Isometric Drawing**	**6**	**2**	**4**		
9	**Engineering Isometric Drawing**	**6**	**2**	**4**		
10	**Engineering Sections**	**6**	**2**	**4**		
11	**Engineering Sections**	**6**	**2**	**4**		
12	**Engineering Sections**	**6**	**2**	**4**		
13	**Steel Constructions**	**6**	**2**	**4**		
14	**Using Computer in Engineering Drawing (Drawing Tools – Edit Tools -Applications)**	**6**	**2**	**4**		

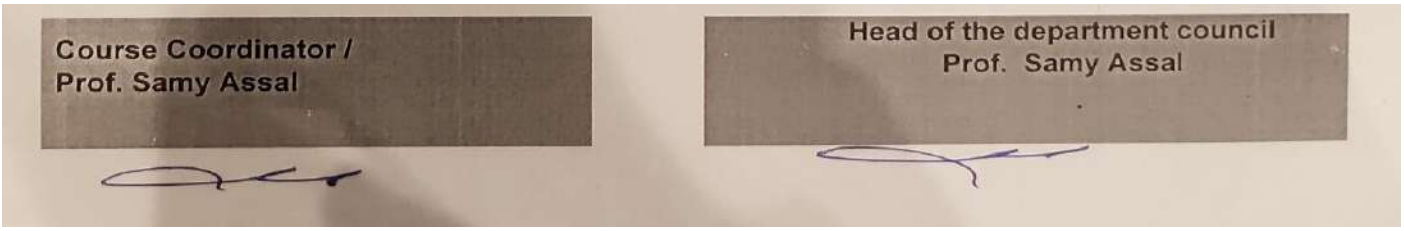
7. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	**Assignments**	**Weekly**	**25**	**25%**
2	**Mid Term Exam**	**8th week**	**15**	**15%**
3	**Quizzes**	**4th and 10th weeks**	**10**	**10%**
4	**Final exam**	**As Scheduled**	**50**	**50%**

8. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	• Griffiths, Brian. Engineering drawing for manufacture. Elsevier, 2023 • Agrawal, Basant, and C. M. Agrawal. Engineering Drawing. McGraw Hill Education (India), 2024. • Madsen, David A., and David P. Madsen. Engineering drawing and design. Cengage Learning, 2025

	Other References	Notes are given to students according to types of given projects
	Electronic Sources (Links must be added)	
	Learning Platforms (Links must be added)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	• Computers or laptop and good Internet for hybrid learning. • White board. • Data Show (Power point presentations). • Online Recorded Videos.
	Supplies	
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	



Course Specification

(2026/2027)

1. Basic Information

Course Title (according to the bylaw)	**Engineering Drawing (2)**			
Course Code (according to the bylaw)	PDE 022			
Department/s participating in delivery of the course	Production Engineering and Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	4	--	6
Course Type	اجباري			
Academic level at which the course is taught	**0 Level**			
Academic Program	Production Engineering and Mechanical Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Prof. Samy Assal			
Course Specification Approval Date	September 2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council)	Department council			

1. Course Overview (Brief summary of scientific content)

This course aims to:

- build the imagination of the students regarding 3d objects.
- provide students with knowledge and abilities to design a 3D object on 2D paper by hand sketching method and by means of computer aided design software.
- familiarize the student with different steel sections and structures.

2. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development	LO1	**Describe** the principles of orthographic projection, sectional drawing, and isometric representation of engineering objects.
		LO2	**Analyze** engineering drawings to derive missing orthographic views and interpret three-dimensional objects.
		LO3	**Compare** orthographic, isometric, and sectional drawing techniques for engineering applications.
		LO4	**Interpret** engineering drawings to select the appropriate graphical representation of engineering components.
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	LO5	**Design** engineering drawings of simple steel structures using manual drafting and computer-aided drawing tools.
		LO6	**Communicate** engineering concepts effectively through professional engineering drawings and graphical presentations.
		LO7	**Illustrate** engineering drawing standards, symbols, and conventions used in steel construction and computer-aided drafting.
		LO8	**Apply** engineering drawing standards to produce accurate orthographic, sectional, and isometric drawings.
A10	Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.	LO1	**Describe** the principles of orthographic projection, sectional drawing, and isometric representation of engineering objects.
		LO9	**Use** computer-aided drafting tools and engineering drawing instruments to prepare engineering drawings accurately.
		LO6	**Communicate** engineering concepts effectively through professional engineering drawings and graphical presentations.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to design, build, operate, inspect and maintain mechanical equipment and systems.	LO1	**Describe** the principles of orthographic projection, sectional drawing, and isometric representation of engineering objects.
		LO9	**Use** computer-aided drafting tools and engineering drawing instruments to prepare engineering drawings accurately.
		LO4	**Interpret** engineering drawings to select the appropriate graphical representation of engineering components.

3. Teaching and Learning Methods

1. Lectures.
2. Tutorials.
3. Exercise/solved – problem classes.
4. Problem sheet assignments.
5. Research skills development.
6. Direct reading and independent studies

5. Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments/ Projects/ ...)	**Other** (to be determined)
1	**Orthogonal Projection of Bodies**	**6**	**2**	**4**		
2	**Orthogonal Projection of Bodies**	**6**	**2**	**4**		
3	**Orthogonal Projection of Bodies**	**6**	**2**	**4**		
4	**Derivation of the Third View**	**6**	**2**	**4**		
5	**Derivation of the Third View**	**6**	**2**	**4**		

6	**Derivation of the Third View**	**6**	**2**	**4**		
7	**Engineering Isometric Drawing**	**6**	**2**	**4**		
8	**Engineering Isometric Drawing**	**6**	**2**	**4**		
9	**Engineering Isometric Drawing**	**6**	**2**	**4**		
10	**Engineering Sections**	**6**	**2**	**4**		
11	**Engineering Sections**	**6**	**2**	**4**		
12	**Engineering Sections**	**6**	**2**	**4**		
13	**Steel Constructions**	**6**	**2**	**4**		
14	**Using Computer in Engineering Drawing (Drawing Tools – Edit Tools -Applications)**	**6**	**2**	**4**		

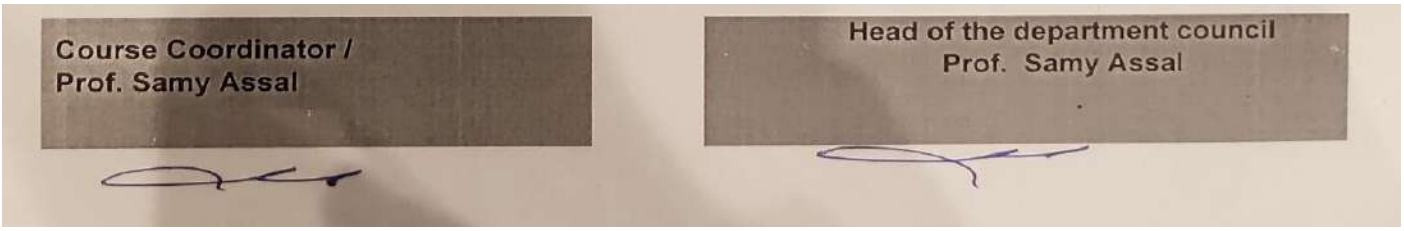
7. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	**Assignments**	**Weekly**	**25**	**25%**
2	**Mid Term Exam**	**8th week**	**15**	**15%**
3	**Quizzes**	**4th and 10th weeks**	**10**	**10%**
4	**Final exam**	**As Scheduled**	**50**	**50%**

8. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	• Griffiths, Brian. Engineering drawing for manufacture. Elsevier, 2023 • Agrawal, Basant, and C. M. Agrawal. Engineering Drawing. McGraw Hill Education (India), 2024. • Madsen, David A., and David P. Madsen. Engineering drawing and design. Cengage Learning, 2025

	Other References	Notes are given to students according to types of given projects
	Electronic Sources (Links must be added)	
	Learning Platforms (Links must be added)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	• Computers or laptop and good Internet for hybrid learning. • White board. • Data Show (Power point presentations). • Online Recorded Videos.
	Supplies	
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	



Course Specification

(2026/2027)

1. Basic Information

Course Title (according to the bylaw)	Facilities Planning			
Course Code (according to the bylaw)	PDE441			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	3			3x hrs.
Course Type	Mandatory			
Academic level at which the course is taught	4th level			
Academic Program	Production Engineering & Mechanical Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Prof. Ahmed Elkassas			
Course Specification Approval Date	September 2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)				

2. Course Overview (Brief summary of scientific content)

This course aims to:

- **Cover contemporary approaches for designing new facilities and improving existing facilities in manufacturing, service, and warehouse organizations.**
- **Introduce facility layout planning methods as well as the inter-relationships between physical layouts (facilities, departments, or work cells), process flows, and material handling systems.**
- **Provide students with techniques for generating, improving, and evaluating facility layout solutions, and creating final layouts using 2D CAD software.**
- **Teach students how to perform space and equipment requirement analysis, analyze material flow, develop layout alternatives, and select the preferred layout by implementing optimization procedures**

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics	LO1	Identify and summarize layout problems
		LO3	Identify and categorize present layout constraints in a layout problem, and consider the identified constraint(s)
		LO6	Identify and summarize layout design considerations for creating inclusive workspaces
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions	LO2	Generate and evaluate detailed solutions to facilities layout problems for manufacturing, service and warehouse systems

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A5	Practice research techniques and methods of investigation as an inherent part of learning.	LO3	Identify and categorize present layout constraints in a layout problem, and consider the identified constraint(s)
A8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	LO8	Present 2-dimensional detailed layouts using CAD software specifying the space requirement of each layout component
		LO9	Present facility design project information orally and verbally in class presentations and a formal business report
B2	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.	LO4	Utilize contemporary techniques to address a real-world facility design project and compare the performance of the different implemented techniques
		LO5	Generate recommendations about space requirements, process/product flow and new proposed layout facility design projects
		LO7	Associate the applications of material handling techniques with their effect on facility operations
C3	Implement the fundamentals of industrial engineering to analyze, plan, and design production systems	LO5	Generate recommendations about space requirements, process/product flow and new proposed layout facility design projects

4. Teaching and Learning Methods

4.1 Lectures.
4.2 Tutorials.
4.3 Exercise/solved – problem classes.
4.4 Problem assignments.
4.5 Research skills development.

4.6 Direct reading and independent studies.

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Introduction to facilities planning	4	2	2		
2	Product, Process, and Schedule Design	4	2	2		
3,4	Flow systems, Activity Relationships and space requirement	8	4	4		
5	Personnel Requirements – Material Handling	4	2	2		
6,7	Layout Planning Models and Design Algorithm	8	4	4		
8	Warehouse Operations	4	2	2		
9	Manufacturing and Facilities Systems	4	2	2		
10	Quantitative Facilities Planning Models	4	2	2		
11,12	Evaluating and Selecting the Facilities Plan	8	4	4		
13,14	Preparing, Representing, Implementing, and Maintain the Facilities Plan.	8	4	4		

Course Schedule

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects	Weekly	20	10%
2	Mid Term Exam	8th week	15	15%
3	Quizzes	4th, 8th and 12th weeks	5	5%
4	Reports	3rd,7th,11th and 14th weeks	10	20%
5	Final exam	As Scheduled	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Heragu, Sunderesh S. *Facilities Design*. 5th edition. CRC PRESS, 2024.
	Other References	• Greene, Jack. *Plant Layout and Facility Planning*. CreateSpace Independent Publishing Platform, 2023. • Tompkins, James A., White, John A., Bozer, Yavuz A., and Tanchoco, J. M. A. *Facilities Planning*. 4th edition. NJ: John Wiley & Sons, Inc.,2022
	Electronic Sources (Links must be added)	www.ekb.eg (Egyptian Knowledge Bank)
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	Notes are given to students according to types of their activities
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	
	Supplies	
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

Course Coordinator
Prof. Ahmed Elkassas

Program Coordinator
Prof. Samy Assal

Course Specification

(٢٠٢٦-٢٠٢٧)

١. Basic Information

Course Title (according to the bylaw)	**Project Management**			
Course Code (according to the bylaw)	**PDE٣٤٢**			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	٣			٣ hrs.
Course Type	**Mandatory**			
Academic level at which the course is taught	٣rd Level			
Academic Program	Production Engineering & Mechanical Design Program			
Faculty/Institute	**Faculty of Engineering**			
University/Academy	**Tanta University**			
Name of Course Coordinator	**Prof. Ahmed Elkassas**			
Course Specification Approval Date	**September ٢٠٢٦**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department Council**			

٢. Course Overview (Brief summary of scientific content)

- Provide a comprehensive review of the material planning and production control modules within an Enterprise Resource Planning (ERP) system.
- Introduce learning strategies for managing the ongoing activities that are comprised in production systems to satisfy customer demand.
- Emphasize inventory control management techniques for production planning covering topics from how to coordinate the supply of material, coordinating resources and activities for conducting the production process, and finalizing with the distribution of the product.
- Introducing students to work with different ERP software.

٣. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A١	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	LO١	Identify, analyze, and respond to risks while managing project resources, procurement, and costs.
A٦	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	LO٢	Utilize common forecasting techniques to predict future demand and evaluate them using quantitative techniques
		LO٣	Utilize common forecasting techniques to predict future demand and evaluate them using quantitative techniques
A٨	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	LO٤	Facilitate team building, handle conflict resolution, and motivate teams to achieve successful project completion.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A٩	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	LO٥	Connect technical project strategies with overall corporate and business goals.
C٣	Implement the fundamentals of industrial engineering to analyze, plan, and design production systems	LO٦	Connect technical project strategies with overall corporate and business goals.
		LO٧	Evaluate project performance to identify operational errors and find actionable solutions

٤. Teaching and Learning Methods

٤,١ Lectures.
٤,٢ Tutorials.
٤,٣ Exercise/solved – problem classes.
٤,٤ Problem assignments.
٤,٥ Research skills development.
٤,٦ Direct reading and independent studies.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
١	Introduction and Principles of Project Managements	٤	٢	٢		
٢	Project Definition – Initiating the Project.	٤	٢	٢		
٣	Planning the Project – Estimation Times and Costs.	٤	٢	٢		
٤	Project Scheduling – Schedule Compression Techniques	٤	٢	٢		
٥	Resource Allocation	٤	٢	٢		
٦	Monitoring and Controlling the Project.	٤	٢	٢		
٧,٨	Project Systems Modeling and Optimization	٨	٤	٤		
٩	Cost Systems Analysis	٤	٢	٢		
١٠,١١	Risk Management	٨	٤	٤		
١٢	Professional And Social Responsibility	٤	٢	٢		
١٣,١٤	Industrial Project Management Case Studies.	٤	٢	٢		

٥. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
١	Participation, Activities, sheets	weekly	٢٠	٢٠٪
٢	Mid Term Exam	٨th week	١٥	١٥٪
٣	Quizzes	٦th, ١٠th week	٥	٥٪
٤	Reports	٢nd, ٤th weeks	١٠	١٠٪
٥	Final written examination	As schedule	٥٠	٥٠٪

٦. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	• Paul Belleflamme and Martin Peitz, ٢٠١٠. *Industrial Organization: Markets and Strategies*. Cambridge University Press • L. Cabral, *Introduction to Industrial Organization,* second edition, Mit Press, ٢٠١٧.
	Other References	• Sutton, J. *Sunk Costs and Market Structure.* (Cambridge, MA: MIT Press),٢٠٠٧
	Electronic Sources (Links must be added)	www.ekb.eg (Egyptian Knowledge Bank)
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	• Computers or laptops and good Internet for hybrid learning. • White board. • Data Show (Power point presentations). • Online Recorded Videos.



Course Specification

1. Basic Information

Course Title (according to the bylaw)	Production Engineering			
Course Code (according to the bylaw)	PDE 131			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Lab./Ap.**	**Total**
	2	**2**	**1**	**3**
Course Type	**DR – Mandatory**			
Academic level at which the course is taught	**Level 1st**			
Academic Program	Production Engineering & Mechanical Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	**Dr/ Walid Hassouna**			
Course Specification Approval Date	**9 / 2026**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department council			

2. Course Overview

This course provides a comprehensive introduction to production engineering and machining processes used in modern manufacturing. It covers cutting tool materials, machine tools, cutting fluids, and conventional machining operations, including turning, milling, shaping, drilling, and grinding. The course emphasizes machining parameters, workpiece and tool holding methods, and machining time estimation, complemented by field visits to enhance students' understanding of industrial production practices and manufacturing operations.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	LO3	Explain the different cutting machining times.
		LO5	Link between different production and cutting times.
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	LO2	Illustrate the different processes of machining.
		LO8	Accomplish tasks in a teamwork.
A5	Practice research techniques and methods of investigation as an inherent part of learning.	LO6	Apply different machining processes.
A8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	LO9	Build self-confidence.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	LO1	Mention the basic knowledge about production engineering.
		LO9	Build self-confidence.
B2	Select conventional mechanical equipment according to the required performance.	LO4	Compare between different machining processes.
B3	Select conventional mechanical equipment according to the required performance.	LO5	Link between different production and cutting times.
		LO8	Accomplish tasks in a teamwork.
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.	LO7	Verify the different machine production and cutting times.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
C1	Apply basic theories to production processes, including new techniques in manufacturing, to select appropriate processes and process standards for specific products.	LO7	Verify the different machine production and cutting times.
		LO8	Accomplish tasks in a teamwork.
C2	Design systems, machines, tools and products by applying appropriate standards and developing necessary calculations, construction and operating drawings.	LO2	Illustrate the different processes of machining.
		LO3	Explain the different cutting machining times.
C3	Implement the fundamentals of industrial engineering to analyze, plan, and design production systems.	LO6	Apply different machining processes.
C4	Demonstrate additional capabilities related to the area of focus in design and production engineering and identify appropriate materials for a specific application.	LO7	Verify the different machine production and cutting times.

4. Teaching and Learning Methods

4.1 Lectures.
4.2 Tutorials.
4.3 Practical Exercises in laps.
4.4 Exercise/solved – problem classes.
4.5 Problem sheet assignments.
4.6 Research skills development.
4.7 Direct reading and independent studies.

Teaching and Learning Facilities

- Computer or laptops and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).
- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished Students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Lab./Ap.
1,2	Introduction – process planning	5	2	2	–	1
3	Different bench work	5	2	2	–	1
4,5	Machining processes production and machining times	5	2	2	–	1
6-8	process planning on turning machines	5	2	2	–	1
9	process planning on Milling machines	5	2	2	–	1
10	process planning on Shaping machines	5	2	2	–	1
11	process planning on Drilling machines	5	2	2	–	1
12	process planning on sheet metal	5	2	2	–	1
13	Introduction to forming: Forging	5	2	2	–	1
14	Rolling – Extrusion	5	2	2	–	1

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects	Weekly	15	15%
2	Mid Term Exam	8th week	15	15%
3	Quizzes	4th and 10th weeks	5	5%
4	Reports	3rd,4th,6th,9th and 11st weeks	5	5%
5	Oral examination	15st week	10	10%
6	Final exam	As Scheduled	50	50%

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	➢ Fundamentals of maching and mahine tools, 2nd, ed. Boothoryd, G. & W.A.Knight, N.Y.Marcl, Dekker, 2010. ➢ Fundamentals of Metal Machining and Machine Tools, Third Edition (CRC Mechanical Engineering) - Hardcover (Nov. 1, 2022) by Winston A. Knight and Geoffrey Boothroyd .
	Other References	Many engineering Materials books
	Learning Platforms	**www.ekb.eg (Egyptian Knowledge Bank)**
Supportive facilities & equipment for teaching and learning *	Devices/Instruments	White board. Data Show (Power point presentations).
	Supplies	Printed handouts, drawing sheets, and engineering tools.
	Virtual Labs	Applied in the college laboratory.

Name and Signature
Course Coordinator

Dr/ Walid Hassona
د/ وليد حسونه

Name and Signature
Program Coordinator

Prof. Dr/ Sami Assal
أ.د / سامي عسل

Course Specification

(2026)

1. Basic Information

Course Title (according to the bylaw)	Graduation Project (A)			
Course Code (according to the bylaw)	PDE 451			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Lab / practical tut	Total
	0		3	5
Course Type	PR-MANDATORY			
Academic level at which the course is taught	4rd level 1st semester			
Academic Program	Production Engineering & Mechanical Design			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	PROF.DR. SAMI ASSAL,Prof. Dr. Ahmed M. Elkassas, Prof. Dr. Ezzat Showaib, DR. Mahmoud Ahmadian , Dr. Alaa Eldin Alhamady, , Dr. Nader Nabil ,Dr Abdelhamed Zayed, Dr. Ahmed Hawam, Dr. Ibrahim Eldeeb, Dr Walid Hasona			
Course Specification Approval Date	9/2026			

Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department council**

2. Course Overview (Brief summary of scientific content)

This course acquires the scientific methods of carrying out a complete survey, Provide the previous subjects related to the project subject, Discuss the packages suitable for accomplishing the project

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics	LO1	Mention the modern issues related to the topic of the project.
		LO2	Outline the mathematical and practical bases of the subject of the project.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	LO4	Analyze the selected method of solving the problem under investigation.
		LO7	Measure the required variables correctly.
		LO8	Confirm the theoretical results using the measured results.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	LO3	Classify the different approaches in the field of the project topic.
B1	Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.	LO6	Build up the investigated system in the correct form.
B2	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software	LO5	Develop the suitable schedule for carrying out the task in the suitable sequence.
C1	Apply basic theories to production processes, including new techniques in manufacturing, to select appropriate processes and process standards for specific products.	LO5	Develop the suitable schedule for carrying out the task in the suitable sequence.

4. Teaching and Learning Methods

4.1. Practical lab work
4.2. Applying Software packages
4.3. Web-sites show and demonstration
4.4 self-learning

Teaching and Learning Facilities

- To be defined during the project
- Smart board
- LCD board
- Standard software
- Computers
- Internet computer

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	LAP/AP
1	Survey	1				1
5	Data processing	1				1
12	Main professional and practical part	1				1
14	Conclusions and recommendations	1				1

5. Methods of students' assessment

Assessment Method	Assessment Duration	Schedule	Proportion
Participation, Activities and Projects	-	-	In progress
Total			In progress

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course (must be written in full according to the scientific documentation method)	Depends on the subject.
	Learning Platforms (Links must be added)	Depends on the subject.
Supportive facilities & equipment for teaching and learning *	Devices/Instruments	All laboratories available within the college
	Supplies	*Recorded meetings*
	Electronic Programs	CAD and CAM programs provided by the student's university email account
	Skill Labs/ Simulators	Simulation programs such as SolidWorks, Abacus, or Ansys

Name and Signature
Course Coordinator
PROF.DR. SAMI ASSAL,Prof. Dr. Ahmed M. Elkassas, Prof. Dr. Ezzat Showaib, DR. Mahmoud Ahmadian , Dr. Alaa Eldin Alhamady, , Dr. Nader Nabil ,Dr Abdelhamed Zayed, Dr. Ahmed Hawam, Dr. Ibrahim Eldeeb, Dr Walid Hasona

Name and Signature
Program Coordinator
Prof .DR. Sami Assal

Course Specification

(2026)

1. Basic Information

Course Title (according to the bylaw)	Graduation Project (B)			
Course Code (according to the bylaw)	PDE 452			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Lap / practical tut	Total
	1	1	3	5
Course Type	PR-MANDATORY			
Academic level at which the course is taught	4rd level 2nd semester			
Academic Program	Production Engineering & Mechanical Design			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	PROF. SAMI ASSAL,Prof. Dr. Ahmed M. Elkassas, Prof. Dr. Ezzat Showaib, Dr. Alaa Eldin Alhamady, , Dr. Nader Nabil Dr Abdelhamed Zayed, Dr. Ahmed Hawam, Dr. Ibrahim Eldeeb			
Course Specification Approval Date	9/2026			

Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department council**

2. Course Overview (Brief summary of scientific content)

This course acquires the scientific methods of carrying out a complete survey, Provide the previous subjects related to the project subject, Discuss the packages suitable for accomplishing the project

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics	LO1	Mention the modern issues related to the topic of the project.
		LO2	Outline the mathematical and practical bases of the subject of the project.
		LO10	Solve the mathematical formulas using suitable techniques to obtaining target.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	LO4	Analyze the selected method of solving the problem under investigation.
		LO7	Measure the required variables correctly.
		LO8	Confirm the theoretical results using the measured results.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	LO3	Classify the different approaches in the field of the project topic.
A6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	LO9	Illustrate the main procedures required to accomplish the project topic.
B1	Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.	LO6	Build up the investigated system in the correct form.
B2	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both	LO5	Develop the suitable schedule for carrying out the task in the suitable sequence.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	traditional means and computer-aided tools and software		
B3	**Select conventional mechanical equipment according to the required performance.**	**LO9**	**Illustrate the main procedures required to accomplish the project topic.**
C1	**Apply basic theories to production processes, including new techniques in manufacturing, to select appropriate processes and process standards for specific products.**	**LO8**	**Confirm the theoretical results using the measured results.**
C3	**Implement the fundamentals of industrial engineering to analyze, plan, and design production systems.**	**LO11**	**Compute the requested outputs correctly.**

4. Teaching and Learning Methods

4.1. Lectures
4.2. Practical lab work
4.3. Applying Software packages
4.4. Websites show and demonstration
4.5 self-learning

Teaching and Learning Facilities

- To be defined during the project
- Smart board
- LCD board
- Standard software
- Computers
- Internet computer

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	LAP/AP
1	Survey	5	1	1		3
5	Data processing	5	1	1		3
12	Main professional and practical part	5	1	1		3
14	Conclusions and recommendations	5	1	1		3

5. Methods of students' assessment

Assessment Method	Assessment Duration	Schedule	Proportion
Participation, Activities and Projects	-	-	50
Mid Term Exam	-	-	-
Reports	-	-	-
Oral exam	-	-	-
Final exam	-	-	50
Total			100

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**Depends on the subject.**
	Learning Platforms (Links must be added)	**Depends on the subject.**
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	**All laboratories are available within the college**
	Supplies	***Recorded meetings***
	Electronic Programs	**CAD and CAM programs provided by the student's university email account**
	Skill Labs/ Simulators	**Simulation programs such as SolidWorks, Abacus, or Ansys**

Name and Signature
Course Coordinator
PROF. SAMI ASSAL,Prof. Dr. Ahmed M. Elkassas, Prof. Dr. Ezzat Showaib, Dr. Alaa Eldin Alhamady, , Dr. Nader Nabil Dr Abdelhamed Zayed, Dr. Ahmed Hawam, Dr. Ibrahim Eldeeb

Name and Signature
Program Coordinator

Prof. Dr. Sami Assal

Course Specification

Course Specification

(2026/ 2027)

1. Basic Information

Course Title (according to the bylaw)	**Numerical Control of Machine Tools**			
Course Code (according to the bylaw)	PDE4130			
Department/s participating in delivery of the course	Production engineering and mechanical design			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	3	2		5
Course Type	اختياري			
Academic level at which the course is taught	الفرقة/المستوي الخامس			
Academic Program	Production engineering and mechanical design			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Dr. Ibraheem Eldeeb			
Course Specification Approval Date	9/1/2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department council			

2. Course Overview (Brief summary of scientific content)

This course is designed to provide final-year students with comprehensive knowledge of modern machine tools and advanced automation control methodologies. The core focus centers on the fundamentals of Computer Numerical Control (CNC) machining operations. Throughout this course, students will gain deep insights into CNC hardware configurations, axis configurations, and control loops. Crucially, the training empowers students to systematically write, verify, and execute standardized CNC programming codes (G-codes & M-codes) for industrial numerical machine tools (such as CNC milling and turning centers) to convert engineering designs into real manufactured parts.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation	CLO5	Utilize contemporary CAD/CAM software tools to simulate, verify, and generate error-free NC toolpaths.
		CLO7	Work productively within collaborative design and manufacturing teams to complete integrated machining projects.
A5	Practice research techniques and methods of investigation	CLO1	Understand the core operating principles of machine tools and automatic numerical control architectures.
		CLO4	Write, debug, and execute complete manual CNC programming codes for complex turning and milling operations.
B2		CLO2	Identify different CNC hardware elements, axis systems, and foundational control loop configurations.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	Plan, manage and carry out designs of mechanical systems	CLO5	Utilize contemporary CAD/CAM software tools to simulate, verify, and generate error-free NC toolpaths.
B3	Select conventional mechanical equipment according to standards	CLO1	Understand the core operating principles of machine tools and automatic numerical control architectures.
		CLO3	Analyze machining processes and cutting parameters suitable for multi-axis CNC machine environments.
C4	Demonstrate additional capabilities related to the area of focus	CLO6	Apply engineering judgments to choose optimal tooling layouts and ensure high-quality surface integrity.

4. Teaching and Learning Methods

1. Lectures (Face-to-face and online via Microsoft Teams)
2. Tutorials and Exercise sessions for solved-problem classes
3. Teamwork groups and practical lab coding assignments
4. Problem sheet assignments and report writing to develop research skills
5. Direct reading and independent self-learning studies
6. **Support for struggling students:** Additional lectures on basic principles and online discussions.
7. **Support for distinguished students:** Advanced exercise problems and critical thinking homework.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Introduction to Numerical Control and Automation Frameworks	5	3	2		
2	Classifications and Layouts of CNC Machine Tools	5	3	2		
3	CNC Machine Construction and Hardware Structural Components	5	3	2		
4	Coordinate Systems, Reference Points, and Control Loops	5	3	2		
5	Principles of Manual Part Programming (Structure of NC Blocks)	5	3	2		
6	CNC Turning: Preparatory Functions and Linear Interpolation	5	3	2		
7	CNC Turning: Circular Interpolation and Tool Nose Compensation	5	3	2		
8	**Mid-Term Exam**	1				1
9	CNC Milling: Axis Layouts, G90/G91 Modes & Tool Length Offsets	5	3	2		
10	CNC Milling: Cutter Radius Compensation (G41/G42)	5	3	2		
11&12	Canned Cycles for Hole Machining (Drilling, Tapping, Boring)	5	3	2		
13&14	Introduction to CAD/CAM Integration and Automated Toolpaths	5	3	2		

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks

1	Exam 1written (Quiz)	Weeks 4 and 10	10	8%
2	Exam 2 ..... (Mid Term)	Week 8	20	16%
3	Final Written Exam	End of Semester (As Scheduled)	85	68%
	Final Practical/Clinical/... Exam			
	Final Oral Exam			
	Assignments / Project /Portfolio/ Logbook	Continuous (Week 1 to 15)	10	8%
	Field training			
	Other (Mention)			

*** The methods mentioned are examples, the organization may add and/or delete**

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Wyatt, J. (2024). *CNC Machining Processes: A Guide to Machine Tools and Programming.* Cognella. Groover, M. P. (2021). *Automation, Production Systems, and Computer-Integrated Manufacturing* (5th ed.). Pearson.
	Other References	* Detailed lecture handouts and industrial CNC machine programming manuals compiled by the instructor.
	Electronic Sources (Links must be added)	Electronic Files (PDF/Word), Recorded Lectures (MP4, AVI).
	Learning Platforms (Links must be added)	Microsoft Teams (Online lectures & recorded meetings), Egyptian Knowledge Bank (www.ekb.eg).
	Other (to be mentioned)	
	Devices/Instruments	Computer/Laptop, Data Show projector.

Supportive facilities & equipment for teaching and learning *	Supplies	Whiteboard, high-speed Internet for hybrid learning.
	Electronic Programs	CAD/CAM software packages (such as Mastercam, SolidCAM, or Fusion360) and G-code simulators.
	Skill Labs/ Simulators	Production Engineering Laboratories / CNC Machine Shop Trainer Lab.
	Virtual Labs	
	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature Course Coordinator Dr. Ibraheem Eldeeb

Name and Signature Program Coordinator Prof. Dr. Samy Assal أ.د. سامى عسل

Course Specification

(٢٠٢٦- ٢٠٢٧)

١. Basic Information

Course Title (according to the bylaw)	**Corrosion of Metals**			
Course Code (according to the bylaw)	PDE ٤٢٥			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	٢	٢		٣
Course Type	اختياري			
Academic level at which the course is taught	**الفرقة/المستوي الثاني**			
Academic Program	Production Engineering & Mechanical Design Department			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator				
Course Specification Approval Date	Sep,٢٠٢٦			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department Council**			

٢. Course Overview

This course aims to:

- Provide sufficient understanding of the principles and practices associated with corrosion of metals
- Provide sufficient understanding of types of corrosion and the ways have been provided to eliminate it.
- Applications to make protective coating and protective maintenance.

- **Course Learning Outcomes CLOs**

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A١	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	LO١	Mention the principles of corrosion
		LO٣	Mention types of corrosion
		LO٦	Analyze failures due to corrosion
A٢	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	LO٥	Use simulation to predict part age
		LO٦	Analyze failures due to corrosion
A٥	Practice research techniques and methods of investigation as an inherent part of learning.	LO٥	Illustrate the mechanisms of high-temperature corrosion and catastrophic corrosion damage.
A٧	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	LO٧	Suggest corrosion maintenance
A٩	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	LO٧	Suggest corrosion maintenance
		LO٨	Suggest material selection
		LO١٠	Preserve how to decrease corrosion rate

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
B٢	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.	LO٥	Use simulation to predict part age
		LO٨	Suggest material selection
		LO٩	Preserve protective coating
B٣	Select conventional mechanical equipment according to the required performance.	LO٧	Suggest corrosion maintenance
		LO١٢	Mention Anodic protective
B٤	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.	LO٩	Preserve protective coating
C١	Apply basic theories to production processes, including new techniques in manufacturing, to select appropriate processes and process standards for specific products.	LO١	Mention the principles of corrosion
		LO٢	Mention some examples of harmful effects
		LO٣	Mention types of corrosion
C٢	Design systems, machines, tools and products by applying appropriate standards and developing necessary calculations, construction and operating drawings.	LO٨	Suggest material selection
		LO٩	Preserve protective coating

٣. Teaching and Learning Methods

١-Lectures.
٢-Tutorials.
٣- Exercise/solved – problem classes.
٤- Problem sheet assignments.

٥- Research skills development.
٦-Direct reading and independent studies

Teaching and Learning Facilities

- Computer or laptop and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).
- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
١	Introduction to corrosion engineering	٤	٢	٢		
٢,٣	Electrochemical principles and forms of corrosion	٨	٤	٢	٢	-
٤,٥	Corrosion of metals and alloys	٨	٤	٤		
٦,٧	High-temperature corrosion and catastrophic corrosion	٨	٤	٢	٢	
٨,٩	Corrosion monitoring, inspection, and failure analysis	٨	٤	٢	٢	
١٠,١١	Corrosion prevention and protective coatings	٨	٤	٤		
١٢	Cathodic and anodic protection methods	٤	٢	٢		
١٣	Corrosion inhibitors and maintenance techniques	٤	٢	٢		
١٤	Corrosion modeling, life prediction, and computer applications	٤	٢	٢		

٤. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
١	Participation, Activities and Projects	-		١٠٪
٢	Mid Term Exam	٦٠ min		٢٥٪
٣	Oral Exam	-		٠٪
٤	Reports	-		١٥٪
٥	Final exam	١٨٠ min		٥٠٪

	Total			١٠٠٪

٥. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Shreir's Corrosion – T. A. Richardson. ▪ ASM Handbook, Heat Treatment, Vol.٠٤. ▪ **Branko N. Popov.** *Corrosion Engineering: Principles and Solved Problems,* **٢nd Edition**, Elsevier, ٢٠٢٤.
	Other References	▪ Lecture notes and handouts prepared by the course instructor.
	Electronic Sources (Links must be added)	
	Learning Platforms (Links must be added)	www.ekb.eg **(Egyptian Knowledge Bank)**
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	
	Supplies	Computer or laptop and good Internet for hybrid learning.
	Electronic Programs	White board. Data Show (Power point presentations).
	Skill Labs/ Simulators	Online Recorded Videos.
	Virtual Labs	

Name and Signature
Course Coordinator

Name and Signature
Program Coordinator

Prof. Samy Asl
أ.د سامى عسل

Course Specification

(2026-2027)

1. Basic Information

Course Title (according to the bylaw)	**Metal casting**			
Course Code (according to the bylaw)	MPD2108			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Tutorial**	**Total**
	2	1	**2**	**3**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الثاني			
Academic Program	Production Engineering & Mechanical Design Department			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Prof. Mohamoud Ahmadin			
Course Specification Approval Date	Sep,2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department Council**			

2. Course Overview

The course introduces students to the principle of casting solidification and technological details of various casting techniques. It also discussed the limitations of each casting process. Moreover, it enhances students' skills to control the cast structure and to produce defect-free products.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	LO3	Explain the different fluid flow modes and their effects on the quality of the cast part.
		LO5	Recommend the most appropriate casting .process for a given application
		LO11	manage mechanical drawing and sectioning of 3D objects
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	LO2	Describe the types of patterns, pattern materials, molds, gates, and feeders.
		LO8	Preserve the casting mold and the molten alloy
		LO10	Apply the visual casting and defects a location
A5	Practice research techniques and methods of investigation as an inherent part of learning.	LO6	Suggest the most convenient location for parting-line, gates and feeders.
		LO12	Use computer programs to plot curves, e.g. cooling curve of the molten metals, and to simulate the production processes.
A7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	LO3	Explain the different fluid flow modes and their effects on the quality of the cast part.
A9	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	LO1	Mention the different types of casting processes.
		LO9	Perform casting experiments on case studies.
B2	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.	LO4	Analyze the geometry of the product.
		LO11	manage mechanical drawing and sectioning of 3D objects

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
B3	Select conventional mechanical equipment according to the required performance.	LO5	Recommend the most appropriate casting process for a given application.
		LO8	Preserve the casting mold and the molten alloy
		LO12	Use computer programs to plot curves, e.g. cooling curve of the molten metals, and to simulate the production processes.
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.	LO7	Develop a casting mold design that includes suitable gates, feeders, shrinkage allowances, and other design allowances.
C1	Apply basic theories to production processes, including new techniques in manufacturing, to select appropriate processes and process standards for specific products.	LO7	Develop a casting mold design that includes suitable gates, feeders, shrinkage allowances, and other design allowances.
		LO8	Preserve the casting mold and the molten alloy
		LO10	Apply the visual casting and defects a location
C2	Design systems, machines, tools and products by applying appropriate standards and developing necessary calculations, construction and operating drawings.	LO2	Describe the types of patterns, pattern materials, molds, gates, and feeders.
		LO3	Explain the different fluid flow modes and their effects on the quality of the cast part.
		LO6	Suggest the most convenient location for parting-line, gates and feeders.
		LO12	Use computer programs to plot curves, e.g. cooling curve of the molten metals, and to simulate the production processes.

4. Teaching and Learning Methods

1-Lectures.
2-Tutorials.
3- Exercise/solved – problem classes.
4- Problem sheet assignments.
5- Research skills development.
6-Direct reading and independent studies

Teaching and Learning Facilities

- Computer or laptop and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).

- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

5. Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Introduction to casting	3	3			
2,4	Melting, melt treatment and casting solidification	9	6	3	2	
5,6	Shape casting technology	6	4	2	1	
7-9	Sand casting process	9	5	4	3	
10,11	Casting of primary products (Cast house)	6	4	2	2	
12,13	Casting quality	6	4	2	1	
14	Revision	3	2	2		

6. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects	-		10%
2	Mid Term Exam	60 min		15%
3	Oral Exam	-		20%
4	Reports	-		15%

5	Final exam	120 min		40%
	Total			100%

7. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course (must be written in full according to the scientific documentation method)	▪ D. K. Singh, Fundamentals of Manufacturing Engineering: Concepts and Applications, Third Edition, Springer Nature Singapore Pte Ltd. 2024
	Other References	▪ . American Foundry Society Inc., "Basic principles of gating and risering".
	Electronic Sources (Links must be added)	www.ekb.eg (Egyptian Knowledge Bank)
	Learning Platforms (Links must be added)	www.ekb.eg
Supportive facilities & equipment for teaching and learning *	Devices/Instruments	Melting furnace, Green sand muller, wooden patterns
	Supplies	Ingredients of the green sand
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	

Name and Signature
Course Coordinator

Prof. Mohamoud Ahmadin
ا.د. محمود احمدين

Name and Signature
Program Coordinator

Prof. Samy Asl
ا.د سامى عسل

Course Specification

(٢٠٢٦- ٢٠٢٧)

١. Basic Information

Course Title (according to the bylaw)	**Metallurgical Processes**			
Course Code (according to the bylaw)	PDE ٤٢٤			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	٢	٢		٣
Course Type	اختياري			
Academic level at which the course is taught	**الفرقة/المستوي الثاني**			
Academic Program	Production Engineering & Mechanical Design Department			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator				
Course Specification Approval Date	Sep,٢٠٢٦			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department Council**			

٢. Course Overview

This course aims to:

- Provide sufficient understanding of the principles and practices associated with heat treatment of steel
- Provide sufficient understanding of thermal behavior of fuel fired furnaces like heat transfer inside furnaces, combustion of fuel, and the efficient furnace operation for conservation of energy and to minimize pollutant emissions.
- Applications to smelting furnaces for iron, aluminum, etc. are also included.

٣. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A١	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	LO١	Define the types of metals and alloys, phase diagrams, grain structures.
		LO٢	List the temperature range of heating of different steels during heat treatment
		LO٤	Explain the procedure of heat treatment and the effect of each on mechanical properties of alloys
A٢	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	LO٨	Reconstruct ITT diagrams
		LO٩	Suggest the cooling paths and quench medium for certain heat treatment.
		LO١١	Perform the effect of heat treatment on grain size, hardness, tensile strength, elongation and fatigue resistance.
A٥		LO٧	Interpret the various grain structures in micrographs

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	Practice research techniques and methods of investigation as an inherent part of learning.	LO١١	Perform the effect of heat treatment on grain size, hardness, tensile strength, elongation and fatigue resistance
A٧	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	LO١١	Perform the effect of heat treatment on grain size, hardness, tensile strength, elongation and fatigue resistance
A٩	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	LO٦	Suggest solutions for the environmental impact of industrial furnaces.
		LO١٠	Evaluate the proper heat treatment technique for certain application.
B٢	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.	LO٥	Analyze the parameters affecting the furnace efficiency.
		LO٦	Suggest solutions for the environmental impact of industrial furnaces.
B٣	Select conventional mechanical equipment according to the required performance.	LO٣	Illustrate the industrial furnaces and heat transfer modes inside them.
		LO١٠	Evaluate the proper heat treatment technique for certain application.
B٤	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.	LO٥	Analyze the parameters affecting the furnace efficiency.
C١	Apply basic theories to production processes, including new	LO١	Define the types of metals and alloys, phase diagrams, grain structures.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	techniques in manufacturing, to select appropriate processes and process standards for specific products.	LO٢	List the temperature range of heating of different steels during heat treatment.
C٢	Design systems, machines, tools and products by applying appropriate standards and developing necessary calculations, construction and operating drawings.	LO٣	Illustrate the industrial furnaces and heat transfer modes inside them.
		LO٨	Reconstruct ITT diagrams
		LO٩	Suggest the cooling paths and quench medium for certain heat treatment.

٤. Teaching and Learning Methods

١-Lectures.
٢-Tutorials.
٣- Exercise/solved – problem classes.
٤- Problem sheet assignments.
٥- Research skills development.
٦-Direct reading and independent studies

Teaching and Learning Facilities

- Computer or laptop and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).
- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
١	Introduction to furnaces	٣	٣			
٢,٣	Electrical and non-electrical furnaces	٦	٤	٢	١	
٤,٥	Heat transfer and design of furnaces	٦	٤	٢		
٦:٨	Introduction to heat treatment - Elements and steps	٩	٧	٢		
٩	Heat treatment of steels and cast irons	٣	٣	١	١	
١٠:١٤	Heat treatment of non-ferrous metals	١٥	١٠	٤	١	

٥. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
١	Participation, Activities and Projects	-		١٠٪
٢	Mid Term Exam	٦٠ min		٢٥٪
٣	Oral Exam	-		٠٪
٤	Reports	-		١٥٪
٥	Final exam	١٢٠ min		٥٠٪
	Total			١٠٠٪

٦. Learning Resources and Supportive Facilities *

Learning resources (books,	The main (essential) reference for the course (must be written in full according to the scientific documentation method)	▪ ASM Handbook, Heat Treatment, Vol.٠٤.

scientific references, etc.) *	**Other References**	▪ Sinha, Anil Kumar, Physical Metallurgy Handbook, McGraw-Hill, ٢٠٠٣
	Electronic Sources (Links must be added)	
	Learning Platforms (Links must be added)	www.ekb.eg **(Egyptian Knowledge Bank)**
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	
	Supplies	Computer or laptop and good Internet for hybrid learning.
	Electronic Programs	White board. Data Show (Power point presentations).
	Skill Labs/ Simulators	Online Recorded Videos.
	Virtual Labs	

Name and Signature
Course Coordinator

Name and Signature
Program Coordinator

Prof. Samy Asl
أ.د سامى عسل

Course Specification

(2026-2027)

1. Basic Information

Course Title (according to the bylaw)	Metal casting
Course Code (according to the bylaw)	PDE 231
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Department
Number of credit hours/points of the course (according to the bylaw)	Theoretical: 2 — Practical/Lab: 1 — Tutorial: 2 — Total: 3
Course Type	اجباري
Academic level at which the course is taught	الفرقة/المستوي الثاني
Academic Program	Production Engineering & Mechanical Design Department
Faculty/Institute	Faculty of Engineering
University/Academy	Tanta University
Name of Course Coordinator	Prof. Mohamoud Ahmadin
Course Specification Approval Date	Sep,2026
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council

2. Course Overview

The course introduces students to the principle of casting solidification and technological details of various casting techniques. It also discussed the limitations of each casting process. Moreover, it enhances students' skills to control the cast structure and to produce defect-free products.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	LO3	Explain the different fluid flow modes and their effects on the quality of the cast part.
		LO5	Recommend the most appropriate casting .process for a given application
		LO19	Apply the visual casting and defects a location
		LO11	manage mechanical drawing and sectioning of 3D objects
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	LO2	Describe the types of patterns, pattern materials, molds, gates, and feeders.
		LO8	Preserve the casting mold and the molten alloy
		LO10	Apply the visual casting and defects a location
A5	Practice research techniques and methods of investigation as an inherent part of learning.	LO6	Suggest the most convenient location for parting-line, gates and feeders.
		LO12	Use computer programs to plot curves, e.g. cooling curve of the molten metals, and to simulate the production processes.
A7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	LO3	Explain the different fluid flow modes and their effects on the quality of the cast part.
A9	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	LO1	Mention the different types of casting processes.
		LO9	Perform casting experiments on case studies.
B2	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.	LO4	Analyze the geometry of the product.
		LO11	manage mechanical drawing and sectioning of 3D objects

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
B3	Select conventional mechanical equipment according to the required performance.	LO5	Recommend the most appropriate casting process for a given application.
		LO8	Preserve the casting mold and the molten alloy
		LO12	Use computer programs to plot curves, e.g. cooling curve of the molten metals, and to simulate the production processes.
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.	LO7	Develop a casting mold design that includes suitable gates, feeders, shrinkage allowances, and other design allowances.
C1	Apply basic theories to production processes, including new techniques in manufacturing, to select appropriate processes and process standards for specific products.	LO7	Develop a casting mold design that includes suitable gates, feeders, shrinkage allowances, and other design allowances.
		LO8	Preserve the casting mold and the molten alloy
		LO10	Apply the visual casting and defects a location
C2	Design systems, machines, tools and products by applying appropriate standards and developing necessary calculations, construction and operating drawings.	LO2	Describe the types of patterns, pattern materials, molds, gates, and feeders.
		LO3	Explain the different fluid flow modes and their effects on the quality of the cast part.
		LO6	Suggest the most convenient location for parting-line, gates and feeders.
		LO12	Use computer programs to plot curves, e.g. cooling curve of the molten metals, and to simulate the production processes.

4. Teaching and Learning Methods

1-Lectures.
2-Tutorials.
3- Exercise/solved – problem classes.
4- Problem sheet assignments.
5- Research skills development.
6-Direct reading and independent studies

Teaching and Learning Facilities

- Computer or laptop and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).

- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

5. Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Introduction to casting	3	3			
2,4	Melting, melt treatment and casting solidification	9	6	3	2	
5,6	Shape casting technology	6	4	2	1	
7-9	Sand casting process	9	5	4	3	
10,11	Casting of primary products (Cast house)	6	4	2	2	
12,13	Casting quality	6	4	2	1	
14	Revision	3	2	2		

6. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects	-		10%
2	Mid Term Exam	60 min		15%
3	Oral Exam	-		20%
4	Reports	-		15%

5	Final exam	120 min		40%
	Total			100%

7. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course (must be written in full according to the scientific documentation method)	▪ D. K. Singh, Fundamentals of Manufacturing Engineering: Concepts and Applications, Third Edition, Springer Nature Singapore Pte Ltd. 2024
	Other References	▪ . American Foundry Society Inc., "Basic principles of gating and risering".
	Electronic Sources (Links must be added)	www.ekb.eg (Egyptian Knowledge Bank)
	Learning Platforms (Links must be added)	www.ekb.eg
Supportive facilities & equipment for teaching and learning *	Devices/Instruments	Melting furnace, Green sand muller, wooden patterns
	Supplies	Ingredients of the green sand
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	

Name and Signature
Course Coordinator

Prof. Mohamoud Ahmadin
ا.د. محمود احمدين

Name and Signature
Program Coordinator

Prof. Samy Asl
ا.د سامى عسل

Course Specification

(2026/2027)

1. Basic Information

Course Title (according to the bylaw)	Facilities Planning			
Course Code (according to the bylaw)	PDE441			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	3			3x hrs.
Course Type	Mandatory			
Academic level at which the course is taught	4th level			
Academic Program	Production Engineering & Mechanical Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Prof. Ahmed Elkassas			
Course Specification Approval Date	September 2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)				

2. Course Overview (Brief summary of scientific content)

This course aims to:

- **Cover contemporary approaches for designing new facilities and improving existing facilities in manufacturing, service, and warehouse organizations.**
- **Introduce facility layout planning methods as well as the inter-relationships between physical layouts (facilities, departments, or work cells), process flows, and material handling systems.**
- **Provide students with techniques for generating, improving, and evaluating facility layout solutions, and creating final layouts using 2D CAD software.**
- **Teach students how to perform space and equipment requirement analysis, analyze material flow, develop layout alternatives, and select the preferred layout by implementing optimization procedures**

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics	LO1	Identify and summarize layout problems
		LO3	Identify and categorize present layout constraints in a layout problem, and consider the identified constraint(s)
		LO6	Identify and summarize layout design considerations for creating inclusive workspaces
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions	LO2	Generate and evaluate detailed solutions to facilities layout problems for manufacturing, service and warehouse systems

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A5	Practice research techniques and methods of investigation as an inherent part of learning.	LO3	Identify and categorize present layout constraints in a layout problem, and consider the identified constraint(s)
A8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	LO8	Present 2-dimensional detailed layouts using CAD software specifying the space requirement of each layout component
		LO9	Present facility design project information orally and verbally in class presentations and a formal business report
B2	Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.	LO4	Utilize contemporary techniques to address a real-world facility design project and compare the performance of the different implemented techniques
		LO5	Generate recommendations about space requirements, process/product flow and new proposed layout facility design projects
		LO7	Associate the applications of material handling techniques with their effect on facility operations
C3	Implement the fundamentals of industrial engineering to analyze, plan, and design production systems	LO5	Generate recommendations about space requirements, process/product flow and new proposed layout facility design projects

4. Teaching and Learning Methods

4.1 Lectures.
4.2 Tutorials.
4.3 Exercise/solved – problem classes.
4.4 Problem assignments.
4.5 Research skills development.

4.6 Direct reading and independent studies.

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Introduction to facilities planning	4	2	2		
2	Product, Process, and Schedule Design	4	2	2		
3,4	Flow systems, Activity Relationships and space requirement	8	4	4		
5	Personnel Requirements – Material Handling	4	2	2		
6,7	Layout Planning Models and Design Algorithm	8	4	4		
8	Warehouse Operations	4	2	2		
9	Manufacturing and Facilities Systems	4	2	2		
10	Quantitative Facilities Planning Models	4	2	2		
11,12	Evaluating and Selecting the Facilities Plan	8	4	4		
13,14	Preparing, Representing, Implementing, and Maintain the Facilities Plan.	8	4	4		

Course Schedule

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects	Weekly	20	10%
2	Mid Term Exam	8th week	15	15%
3	Quizzes	4th, 8th and 12th weeks	5	5%
4	Reports	3rd,7th,11th and 14th weeks	10	20%
5	Final exam	As Scheduled	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Heragu, Sunderesh S. *Facilities Design*. 5th edition. CRC PRESS, 2024.
	Other References	• Greene, Jack. *Plant Layout and Facility Planning*. CreateSpace Independent Publishing Platform, 2023. • Tompkins, James A., White, John A., Bozer, Yavuz A., and Tanchoco, J. M. A. *Facilities Planning*. 4th edition. NJ: John Wiley & Sons, Inc.,2022
	Electronic Sources (Links must be added)	www.ekb.eg (Egyptian Knowledge Bank)
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	Notes are given to students according to types of their activities
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	
	Supplies	
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

Course Coordinator
Prof. Ahmed Elkassas

Program Coordinator
Prof. Samy Assal

Course Specification

(٢٠٢٦-٢٠٢٧)

١. Basic Information

Course Title (according to the bylaw)	**Mechanical drawing ١**			
Course Code (according to the bylaw)	PDE١١٢			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	٢	٢		٤
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	Production Engineering & Mechanical Design Program			
Faculty/Institute	**Faculty of Engineering**			
University/Academy	**Tanta University**			
Name of Course Coordinator	**Asso.Prof. Ahmed hawam**			
Course Specification Approval Date	**September ٢٠٢٦**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department Council**			

٢. Course Overview (Brief summary of scientific content)

This course serves as the foundational language of engineering communication. Students learn the geometric principles of projection, sectioning, dimensioning, and reading mechanical working drawings using both traditional manual drafting instruments and modern computer-aided design (CAD) software.

٣. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A٢	• Advanced Orthographic Projections & Sections • Derivation of Missing Views: Reconstructing a third projection from two given views. • Cross-Sectional Views: Full sections, half sections, offset sections, aligned sections, and removed sections of machine components. Sectioning Rules & Conventions: Treatment of ribs, webs, shafts, bolts, and thin-walled features in sectional views...	LO٨	• Derivation of Missing Views: Reconstructing a third projection from two given views.
		LO٩	Cross-Sectional Views.
		LO١٠	• half sections, offset sections, aligned sections, and removed sections of machine components. .
A٤	• Advanced Orthographic Projections & Sections • Derivation of Missing Views: Reconstructing a third projection from two given views. • Cross-Sectional Views: Full sections, half sections, offset sections,	LO١	• Advanced Orthographic Projections & Sections

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	aligned sections, and removed sections of machine components. Sectioning Rules & Conventions: Treatment of ribs, webs, shafts, bolts, and thin-walled features in sectional views....		
A٨	• hex nuts, studs, washers, and tapped holes. • Keys & Keyways: Parallel keys, Woodruff keys, taper keys, and feather keys.	LO٢	Keys & Keyways: Parallel keys, Woodruff keys, taper keys, and
		LO٣	• studs, washers, and tapped holes.
		LO٤	Reading Assembly Drawings
		LO١٢	Present data in a logical manner.
B٣	• . Assembly Drawings & Disassembly • Reading Assembly Drawings: Understanding exploded views, parts lists (Bill of Materials / BOM), and component interaction.	LO٦	• . Assembly Drawings & Disassembly
C١	Assembly Exercises: Assembling individual mechanical elements into functional units (e.g., valves, pedestal bearings, wall brackets, vices, shaft couplings, pump assemblies).	LO٥	Assembly Exercise
C٤	Derivation of Projections from Assemblies: Creating complete or	LO٧	Interpret parameters of surface finish.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	sectional elevations, side views, and plans of assembled machine units	LO١١	Manage resources in an efficient way.

٤. Teaching and Learning Methods

١- Lectures.
٢- Tutorials
٣- Exercise/solved – problem classes.
٤- Problem sheet assignments.
٥- Research skills development.
٦- Direct reading and independent studies.
٧- Working in the metrology lab.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
١, ٢	• Advanced Orthographic Projections & Sections	٤	٤	٢		
٣	• Derivation of Missing Views: Reconstructing a third projection from two given views. .	٨	٢	١		
٤	Cross-Sectional Views:	٨	٢	١		

٥, ٨	half sections, offset sections, aligned sections, and removed sections of machine components,	٨	٨	٤		
٩, ١٠	Fasteners & Joining Elements	٨	٤	٢		
١١, ١٢	Threaded Fasteners	٨	٤	٢		
١٣, ١٤	Bolts, Nuts, and Studs	٨	٤	٢		

٥. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
١	Exam 1written (Semester work)	٨th week	١٥	١٠٪
٢	Assignments / Participation /Activities/ Quizzes	Weekly	١٥	١٠٪
٣	Oral exam	١٤th week	٣٠	٢٠٪
٤	Final Written Exam	As Scheduled	٩٠	٦٠٪

* The methods mentioned are examples, the organization may add and/or delete

٦. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	Other References	• Simmons, C. H., Maguire, D. E., & Phelps, N. (٢٠٢٠). Manual of Engineering Drawing: Technical Product Specification and Documentation to British and International Standards (٥th ed.). Elsevier / Butterworth-Heinemann. • Key Focus: Comprehensive reference for orthographic

		projections, sectioning rules, dimensioning conventions, and ISO standardization. • Morling, K., & Danjou, S. (٢٠٢٢). • Geometric and Engineering Drawing (٤th ed.). Routledge. • Key Focus: Descriptive geometry, spatial visualization, multi-view projections, tangency, missing view determination, and CAD integration. • Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Loving, R. O., Dygdon, J. T., & Novak, J. E. (٢٠٢٠). • Technical Drawing with Engineering Graphics (١٥th ed.). Pearson. • Key Focus: Classical foundational text covering manual drafting mechanics, isometric constructions, missing views, and sectional views.
	Electronic Sources (Links must be added)	www.ekb.eg
	Learning Platforms (Links must be added)	Microsoft Teams (for online lectures and discussions)
	Other (to be mentioned)	Electronic Files (PDF/ Word), Recorded Lectures (MP٤, AVI), Recorded meetings.
Supportive facilities & equipment	**Devices/Instruments**	• Measurement instruments (e.g., Vernier calipers, micrometers, gauges) • Computers / laptops

for teaching and learning *	**Supplies**	• Laboratory sheets and measurement samples.
	Electronic Programs	• Statistical analysis software (e.g., Excel or similar tools)
	Skill Labs/ Simulators	• Metrology laboratory
	Virtual Labs	• Online simulation tools (if available)
	Other (to be mentioned)	• Data show (PowerPoint presentations) • Recorded lectures and videos

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature
Course Coordinator

Asso.prof. Ahmed Hawam

Name and Signature
Program Coordinator

Prof. Samy Asl
ا.د سامى عسل



(٢026-2027)

1. Basic Information

Course Title (according to the bylaw)	Theory of Vibration			
Course Code (according to the bylaw)	PDE311			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design Program			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	2	3		5
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الثالث			
Academic Program	Production Engineering & Mechanical Design Program			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Prof. Samy Assal			
Course Specification Approval Date	Aug 2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council			

2. Course Overview (Brief summary of scientific content)

This course introduces the fundamental principles of mechanical vibration and dynamic systems. It focuses on different types of vibration systems, including single-degree-of-freedom and multi-degree-of-freedom systems. Students will study the free and forced vibration behavior of such systems and develop an understanding of their dynamic characteristics. The course also covers the determination of natural frequencies and normal modes, with emphasis on their significance in analyzing and evaluating the vibration response of mechanical systems.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	LO3	Single degree of freedom system: Newton's and Energy methods
		LO4	Single degree of freedom system: free damped vibration
		LO5	Single degree of freedom system: viscous and coulomb damping
		LO6	Single degree of freedom system: forced undamped vibration
		LO14	Multi-degrees of freedom systems
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	LO2	Single degree of freedom system: free undamped vibration
		LO11	Critical speed of shafts
A5	Practice research techniques and methods of investigation as an inherent part of learning.	LO1	Definitions and oscillatory motion
		LO10	Measuring instrument
B4	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to : design, build, operate, inspect and maintain mechanical	LO7	Single degree of freedom system: forced damped vibration
		LO12	Two degrees of freedom system: damped and undamped vibration

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	equipment and systems.		
C4	**Demonstrate additional capabilities related to the area of focus in design and production engineering and identify appropriate materials for a specific application.**	**LO8**	Rotating unbalance, Transmitted force, Transmissibility
		LO9	Support Motion
		LO13	Two degrees of freedom system: forced vibration

4. Teaching and Learning Methods

4.1 Lectures.
4.2 Tutorials.
4.3 Exercise/solved – problem classes.
4.4 Problem sheet assignments.
4.5 Research skills development.
4.6 Direct reading and independent studies.

Teaching and Learning Facilities

- Computer or laptop and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).
- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Definitions and oscillatory motion	5	2	3		
2	Single degree of freedom system: free undamped vibration	5	2	3		
3	Single degree of freedom system: Newton's and Energy methods	5	2	3		
4	Single degree of freedom system: free damped vibration	5	2	3		
4	Single degree of freedom system: viscous and coulomb damping	5	2	3		
5	Single degree of freedom system: forced undamped vibration	5	2	3		
6	Single degree of freedom system: forced damped vibration	5	2	3		
8	Rotating unbalance, Transmitted force, Transmissibility	5	2	3		
8	Support Motion	5	2	3		
9	Measuring instrument	5	2	3		
9	Critical speed of shafts	5	2	3		
10,11	Two degrees of freedom system: damped and undamped vibration	10	4	6		
12,13	Two degrees of freedom system: forced vibration	10	4	6		
14	Multi-degrees of freedom systems	5	2	3		

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects			15%
2	Mid Term Exam			25%
3	Quizzes			5%
	Reports			5%
	Final exam			50%

	Total			100%

* The methods mentioned are examples, the organization may add and/or delete

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Salsa Junior, R. G. (2025). *Fundamentals of the Theory of Mechanical Vibrations*. Springer.
	Other References	Billingsley, J. (2025). *Essentials of Dynamics and Vibrations* (2nd ed.). Springer. Zhang, J., & Zhou, H. (2026). *Random Vibration and Spectrum Analysis*. Springer.
	Electronic Sources (Links must be added)	
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	
	Supplies	
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

* The list mentioned is an example, the institution may add and/or delete depending on the nature of the course

Name and Signature
Course Coordinator
Prof. Samy Assal

Name and Signature
Program Coordinator
Prof. Ahmed Mohamed Nasr

أ.د/ أحمد محمد نصر

Course Specification

(2026)

1. Basic Information

Course Title (according to the bylaw)	Tools Design and Production Facilities			
Course Code (according to the bylaw)	PDE 413			
Department/s participating in delivery of the course	Production Engineering & Mechanical Design			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	2h*14w	2h*14w		4h*14w
Course Type	PR-ELECTIVE			
Academic level at which the course is taught	1st group E1			
Academic Program	Production Engineering & Mechanical Design			
Faculty/Institute	Faculty of Engineering			
University/Academy	Tanta University			
Name of Course Coordinator	Dr. Walid Hassana			
Course Specification Approval Date	9/2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department council			

2. Course Overview (Brief summary of scientific content)

The course studies the different types of materials used in cutting tools & how to select the appropriate one for a specific purpose. Design different cutting tools e.g. (turning tools – milling tools – drilling tools – ...etc.)., Design of workbench tools and accessories., Design of bending and rolling rollers., Design of plastic injection molds., Studying the dimensional and geometrical tolerances.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics	LO1	Define different types od dimensional and geometrical tolerances.
		LO3	Execute designs of cutting tools.
		LO4	Analyze stresses on workbench tools and accessories.
		LO5	Execute designs of accessories used in machining processes.
		LO6	Work in groups on design projects of a cutting tool.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	LO2	Studying different materials used in cutting tools.
		LO6	Work in groups on design projects of a cutting tool.
A10	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations	LO1	Define different types od dimensional and geometrical tolerances.
		LO2	Studying different materials used in cutting tools.
		LO4	Analyze stresses on workbench tools and accessories.
		LO6	Work in groups on design projects of a cutting tool.
B3	Select conventional mechanical equipment according to the required performance.	LO2	Studying different materials used in cutting tools.
		LO3	Execute designs of cutting tools.
		LO5	Execute designs of accessories used in machining processes.
		LO6	Work in groups on design projects of a cutting tool.
C2		LO3	Execute designs of cutting tools.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
	Design systems, machines, tools and products by applying appropriate standards and developing necessary calculations, construction and operating drawings.	LO5	Execute designs of accessories used in machining processes.
		LO6	Work in groups on design projects of a cutting tool.

4. Teaching and Learning Methods

4.1 Lectures.
4.2 Tutorials.
4.3 Exercise/solved – problem classes.
4.4 Problem sheet assignments.
4.5 Research skills development.
4.6 Direct reading and independent studies.
4.7 self-learning

Teaching and Learning Facilities

- Computer or laptop and good Internet for hybrid learning.
- White board.
- Data Show (Power point presentations).
- Online Recorded Videos.
- Lectures (Face to face).
- Lectures (Online/ Microsoft Teams).

Teaching and Learning Methods of unsurpassed

- Additional lectures on basic principles
- Guided and supervised in campus study hours.
- Online discussions.

Teaching and Learning Methods of Distinguished students

- Special homework assignments which require critical thinking.
- Special more advanced exercise problems.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/ Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Definitions, types of dimensional and geometrical tolerances.	4	2	2		
2	Definitions, types of dimensional and geometrical tolerances.	4	2	2		
3	Materials used in cutting tools.	4	2	2		
4	Materials used in cutting tools.	4	2	2		
5	Design of cutting tools.	4	2	2		
6	Design of cutting tools.	4	2	2		
7	Design of cutting tools.	4	2	2		
8	Design of workbench tools and accessories.	4	2	2		
9	Design of workbench tools and accessories.	4	2	2		
10	Design of accessories used in machining processes	4	2	2		
11	Design of accessories used in machining processes	4	2	2		
12	Design of bending and rolling rollers.	4	2	2		
13	Design of plastic injection molds.	4	2	2		
14	Design of plastic injection molds.	4	2	2		

5. Methods of students' assessment

Assessment Method	Assessment Duration	Schedule	Proportion
Participation, Activities and Projects	-	Weekly	10
Mid Term Exam	60 min	8th week	15
Quizzes	15-30 min	4th and 10th weeks	10
Reports	-	3rd,4th,6th,9th and 11st weeks	10
Final exam	120 min	As Scheduled	50
Total			100

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	• **Matthew P. Stephens & Fred E. Meyers. Manufacturing Facilities Design and Material Handling 2024.** • **Albert Atkins Dowd، Frank W. Curtis. Tool Engineering, Jigs and Fixtures, 2023**
	Learning Platforms (Links must be added)	**http://www.ekb.eg(www.ekb.eg (Egyptian Knowledge Bank))**
Supportive facilities & equipment for teaching and learning *	**Supplies**	**Electronic Files (PDF/ Word), Recorded Lectures (MP4, AVI), Recorded meetings.**
	Electronic Programs	**MICROSOFT TEAMS**

Name and Signature
Course Coordinator

Dr. Walid Hassona

Name and Signature
Program Coordinator

Prof. DR. Sami Assal

Course Specification

(2026)

1. Basic Information

Course Title (according to the bylaw)	**Stress Analysis**			
Course Code (according to the bylaw)	**PDE 211**			
Department/s participating in delivery of the course	**Production Engineering & Mechanical Design Program**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**2**		**3**
Course Type	**Prerequisite PDE 122**			
Academic level at which the course is taught	**2nd level**			
Academic Program	**Production Engineering & Mechanical Design Program**			
Faculty/Institute	**Faculty of Engineering – Tanta University**			
University/Academy	**2026-2027**			
Name of Course Coordinator Department	**Prof. Dr. Alaa El-Din Al-Hammadi**			
Course Specification Approval Date	**Sep., 2026**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Council Approval – Production Engineering & Mechanical Design Program**			

2. Course Overview (Brief summary of scientific content)

- **Course Aims**

This course aims to:

- **Deal with different nature of stresses and strains**
- **Understand theories of failure.**
- **Study the basic tools to perform a successful mechanical design.**

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A2	**Develop and conduct appropriate experimentation and/or simulation, analysis and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.**	**LO1**	**Mention the principles and concepts of stress and strain.**
		LO2	**List necessary information for theory of failure.**
		LO4	**Create the theoretical background necessary for design of machine components.**
		LO5	**Integrate methods helping in decision making regarding selection of materials and design of machine components.**
		LO6	**Solve the of stresses and strains for different loading modes.**
A5	**Practice research techniques and methods of investigation as an inherent part of learning.**	**LO3**	**Define the methods of tracing deflection of beams.**

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		LO4	**Create the theoretical background necessary for design of machine components.**
		LO5	**Integrate methods helping in decision making regarding selection of materials and design of machine components.**
		LO6	**Solve the of stresses and strains for different loading modes.**
B3.	**Select conventional mechanical equipment according to the required performance.**	**LO5**	**Integrate methods helping in decision making regarding selection of materials and design of machine components.**
		LO7	**Preserve the factor of safety of a given structure.**
		LO8	**Verify the reasons causing failure of machine components.**
C3	**Implement the fundamentals of industrial engineering to analyse, plan, and design production systems.**	**LO7**	**Preserve the factor of safety of a given structure.**
		LO8	**Verify the reasons causing failure of machine components.**

4. Teaching and Learning Methods

1- **Lectures.**
2. **Tutorials.**
3. **Exercise/solved – problem classes**
4. **Problem sheet assignments.**
5. **Research skills development.**
6. **Direct reading and independent studies.**

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Equilibrium of forces and types of supports	2	2			
2	Calculation of center of gravity and moment of inertia for various cross-sections	2	2			
3	Finding the external and internal reactions under the influence of different loads (normal – shear – twist – bending)	3*2	2	2	2	
4	Stress and strain (concept – calculation at a point – transformation – the relation between them)	2	2			
5	Calculation of the maximum stress and strain at a point in a body under the influence of mixed loads	2*2	2	2		
6	Deflection of beams	2	2			
7	Stress analysis for statically indeterminate beams	2	2			
8	Theories of failure and factor of safety	2	2			
9	Graphical Representation of Stresses and Strains Using Mohr's Circle	2	2			
10	Stresses in Thin and Thick Walled Pressure Vessels	2	2			
11	Thermal Stresses	2	2			

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities	Weekly	10	10%
2	Mid Term Exam	8th week	15	15%
3	Quizzes	4th and 10th weeks	15	15%
4	Reports		10	10%
5	Final exam	3rd,4th,6th,9th and 11st weeks	50	50%
6	Total		100	100%

* The methods mentioned are examples, the organization may add and/or delete

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course (must be written in full according to the scientific documentation method)	• R.C. Hibbeler "Mechanics of Materials", 2017, 10th ed • R. G. Budynas "Shigley's Mechanical Engineering Design", 2019, 11th ed • F.P. Beer "Statics and Mechanics of Materials", 2017, 2nd ed • D. Gross "Engineering Mechanics 2", 2018, 2nd ed • A.Ugural "Advanced Mechanics of Materials and Applied Elasticity", 2019, 6th ed
	Other References	• All the books and scientific research linked to machining technology.
	Electronic Sources (Links must be added)	• www.ekb.eg (Egyptian Knowledge Bank)
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	
Supportive facilities & equipment	Devices/Instruments	
	Supplies	
	Electronic Programs	

for teaching and learning *	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

* The list mentioned is an example, the institution may add and/or delete depending on the nature of the cours

Name and Signature
Course Coordinator

Prof. Dr. Alaa El-Din Al-Hammadi

Name and Signature
Program Coordinator

Prof. Dr. Samy Assal

Course Specification

(2026/ 2027)

1. Basic Information

Course Title (according to the bylaw)	Industrial Operation Research
Course Code (according to the bylaw)	PDE341
Department/s participating in delivery of the course	Production engineering and mechanical design
Number of credit hours/points of the course (according to the bylaw)	Theoretical: 2 / Practical: 2 / Other (specify): / Total: 4
Course Type	اجباري
Academic level at which the course is taught	الفرقه/ المستوي الثالث
Academic Program	Production engineering and mechanical design
Faculty/Institute	Faculty of Engineering
University/Academy	Tanta University
Name of Course Coordinator	Prof. Ahmed ElKassa
Course Specification Approval Date	Sep.,2026
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department council

2. Course Overview (Brief summary of scientific content)

Throughout the course, emphasis is placed on the historical development and fundamental concepts of Operations Research, including Linear Programming models for resource allocation, graphical and analytical solution techniques, Transportation and Assignment models, Scheduling and Sequencing models, Replacement models, Queueing Theory, Game Theory, Dynamic Programming, Decision Theory, Simulation, and Network Problems such as the Shortest Path and Minimum Spanning Tree. These techniques are applied to support decision-making, optimize resource utilization, and improve the efficiency and performance of industrial and production systems.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems	LO1	Demonstrate knowledge of mathematical modeling techniques for solving real-world problems.
		LO2	Demonstrate an understanding of decision-making processes and their application in operational contexts.
		LO3	Analyze, evaluate, and formulate solutions to complex problems using appropriate quantitative methods.
A2	Practice research techniques and methods of	LO1	Demonstrate knowledge of mathematical modeling techniques for solving real-world problems.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	investigation as an inherent part of learning.	LO6	Demonstrate knowledge of supply chain management principles and apply optimization techniques to enhance supply chain efficiency and performance.
A6	Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.	LO2	Demonstrate an understanding of decision-making processes and their application in operational contexts.
		LO3	Analyze, evaluate, and formulate solutions to complex problems using appropriate quantitative methods.
		LO4	Demonstrate an understanding of optimization algorithms and their application to decision-making problems
C3	Implement the fundamentals of industrial engineering to analyze, plan, and design production systems.	LO6	Demonstrate knowledge of supply chain management principles and apply optimization techniques to enhance supply chain efficiency and performance.
		LO4	Demonstrate knowledge of supply chain management principles and apply optimization techniques to enhance supply chain efficiency and performance.

4. Teaching and Learning Methods

1. Lectures (Face-to-face and online via Microsoft Teams)

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Introduction to Operations Research & Modeling Methodology	4	2	2		
2	verbal representation	4	2	2		
3	Linear Programming: Model Formulation (Part 1)	4	2	2		
4	graphical representation of solution	4	2	2		
5	The Simplex Method: Algebraic and Tabular Foundations	4	2	2		
6	Transportation	4	2	2		
7	Assignment	4	2	2		
	Scheduling sequences	4	2	2		
	Networks	4	2	2		

2. Tutorials and Exercise sessions for solved-problem classes
3. Teamwork groups and practical lab coding assignments
4. Problem sheet assignments and report writing to develop research skills
5. Direct reading and independent self-learning studies
6. **Support for struggling students:** Additional lectures on basic principles and online discussions.
7. **Support for distinguished students:** Advanced exercise problems and critical thinking homework.

Course Schedule

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Participation, Activities and Projects	Weekly	-	5%
2	Mid Term Exam	8th week	25	25%
3	Quizzes	Weekly	15	10%
4	Reports	14th week	10	10%
5	Final exam	As Scheduled	50	50%
6	Total			100%

* The methods mentioned are examples, the organization may add and/or delete

5. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Taha, Hamdy A. 2027. *Operations Research: An Introduction*. Prentice Hall of India Private Limited, New Delhi.
	Other References	1- Hillier, F. S., & Lieberman, G. J. (2027). *Introduction to Operations Research* (11th ed.). McGraw-Hill Education, New York. 2- Taha, H. A. (2026). *Operations Research: An Introduction* (10th ed.). Pearson Education Limited, Harlow, England. * Supplementary handout slides and solved algorithm guides prepared by the teaching staff.
	Electronic Sources (Links must be added)	Electronic Files (PDF/Word), Recorded Lectures (MP4, AVI).
	Learning Platforms (Links must be added)	Microsoft Teams (Online lectures & recorded meetings), Egyptian Knowledge Bank (www.ekb.eg).
	Other (to be mentioned)	

Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Computer/Laptop, Data Show projector.
	Supplies	Whiteboard, high-speed Internet for hybrid learning.
	Electronic Programs	Linear programming solver environments (such as LINDO, LINGO, or Excel Solver)
	Skill Labs/ Simulators	Industrial Engineering Design Simulation Laboratory / Computer software lab.
	Virtual Labs	
	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature
Course Coordinator
Prof. Ahmed El-Kassas
أ.د. أحمد القصاص

Name and Signature
Program Coordinator
Prof. Samy Assel
أ.د. سامي عسل