SYLLABUS

Approved,
DEAN
Prof. dr. eng. Gilbert-Rainer GILLICH

1. Program Data

1.1. Institution of Higher Education	**Babeș-Bolyai University**
1.2. Faculty	**Faculty of Engineering**
1.3. Department	**Department of Engineering Science**
1.4. Field of Study	**Electrical engineering**
1.5. Course of Study	**Bachelor**
1.6. Study Programme	**Electromechanics**

2. Discipline Data

2.1. Discipline Name	**Grafică asistată de calculator I / Computer-Aided Graphics I**						
2.2. Course Coordinator	Lect.dr.eng. Vasile Cojocaru						
2.3.1. Seminary Coordinator	-						
2.3.2. Laboratory Coordinator	Lect.dr.eng. Vasile Cojocaru						
2.3.3. Project Coordinator	-						
2.4. Year of Study	1	2.5. Semester	1	2.6. Evaluation Type	C	2.7. Discipline Regime	Cmp.

3. Estimated Total Time (hours per semester of teaching activities)

3.1. Number of Hours per Week	4	from which: 3.2. Course	2	3.3. laboratory	2
3.4. Total Hours from the Curriculum Plan	56	from which: 3.5. Course	28	3.6. laboratory	28
Time Fund Distribution - hours					hours
Study of Handbook, Course Materials, Bibliography & Notes					28
Additional Documentation in Library, on Special E-learning Platforms & in the Field					15
Preparation of seminaries/laboratories/ projects, topics, reports, portfolios & essays					24
Mentoring					0
Examination					2
Other Activities					

3.7. Total Time of Individual Study	**69**
3.8. Total Hours per Semester	**125**
3.9. Number of Credits	**5**

4. Pre-condition (where is the case)

4.1. of Curriculum	• Elements of geometry and technical drawing
4.2. of Competences	• Representation of objects in orthogonal projections, basic rules for technical drawing

5. Condition (where is the case)

5.1. of Course Progress	• Video projection system and computer with specific software
5.2.2. of Laboratory Progress	• Computer lab with specific software (AutoCAD and SolidWorks), computer access for each student

6. Acquired Specific Competences

Professional Competences	• PC1 Application and adaptation of specific knowledge of mathematics, physics, computer science in the field of electrical engineering • PC2 Operate with relevant concepts in the field of computing and information technology • PC3 Model and identify automatic system elements in control systems of electromechanical plants
Transversal Competences	• TC1 Identify the objectives to be achieved, the resources available, the conditions for their completion, the stages of work, the deadlines for completion and the associated risks • TC3 Efficient use of information resources and communication and assisted training resources (Internet portals, specialized software applications, databases, on-line courses, etc.) both in Romanian and in an international language

7. Discipline Objectives (coming out from the Checklist of Acquired Specific Competences)

7.1. General Objective of Discipline	• Acquire the knowledge and develop the skills necessary for the elaboration in CAD environments of graphic documentation specific to the field of activity.
7.2. Specific Objectives	• Development of the spatial vision, the ability to represent objects graphically, the

	ability to read and interpret graphic documentation. • Creating 2D graphic representations and modifying their properties. • Making parameterized 3D models and generating detailed drawings. • Understand the role of 2D and 3D computer aided graphics within computer aided design/analysis/manufacturing systems.

8. Content

8.1. Course	Teaching methods	Observation
General. Organizing your workspace in AutoCAD General principles of generating graphical documentation using CAD software. Computer-aided design environments. AutoCAD design environment. Units of measurement. Coordinate systems. Drawing layers. Rapid drawing using Object Snap, Object Snap Tracking and Polar tracking facilities. Snap to objects. Grids. Object selection. Prototype files.	Presentation. Example in specific software (AutoCAD and SolidWorks). Feedback is provided through dialogue with students.	2 hours
Basic 2D objects Line. Arc. Circle. Polygon. Ellipse. Polyline. Spline. Hatch.		3 hours
Objects Properties Using the properties panel. Using line types. Changing object properties. Copy properties of an existing object.		1 hours
Edit commands Move. Scale. Offset. Trim. Extend. Rotate. Chamfer. Fillet		2 hours
Replication of objects Copy. Mirror. Array. Block		2 hours
Dimensioning and annotation of drawings Creating dimensions. Using dimension styles. Editing dimensions. Annotating the drawing. Using text styles. Editing text.		3 hours
Printing and converting drawings Layouts. Using page settings. Printing drawings. Converting .dwg files		1 hours
SolidWorks design environment Parametric modelling. Workspace in SolidWorks. SolidWorks file types. Reference system. Fundamental planes. Work planes. Support sketches. Sketch constraints		2 hours
Basic 3D features Extrude. Revolve. Hole. Shell. Loft. Sweep.		4 hours
Editing commands. Replication commands Rib. Thread. 3D Fillet. 3D Chamfer. Mirror. Circular Pattern. Rectangular Pattern.		2 hours
Form 3D to technical drawings Manage and edit drawing formats. Translating 3D models into production drawings. Views, sections, details. Dimensioning and annotating production drawings. Tolerances		4 hours
Assembly Importing 3D components into assemblies. Constraints. Direct modelling of components in assemblies		2 hours

Bibliography

1. Nedelcu D., Cojocaru V., *Grafică asistată de calculator prin AutoCAD*, Editura Eftimie Murgu, Reșița, 2010; (videotutoriale la https://www.youtube.com/playlist?list=PL7P0JBijOcQDO85uvD_Z9KbhgmzPIWKxR);
2. Cojocaru, V., Technical drawing and computer graphics III, laboratory support, online platform including support materials and video tutorials, available at https://sites.google.com/view/dti3.
3. Nedelcu, .D., *Proiectare şi simulare numerică cu SolidWorks*, Editura Eurostampa, Timişoara, 2011;
4. Nedelcu D., *Modelare parametrică prin Autodesk Inventor,* Editura Orizonturi Universitare, Timișoara, 2004;
5. Nedelcu D., *Aplicatii 2D/3D de proiectare asistata de calculator,* Editura Orizonturi Universitare, Timișoara, 2003;
6. Simion I., *Autocad 2011 pentru ingineri*, Editura Teora, București, 2011;
7. Badut M., *AutoCAD-ul în trei timpi*, ediția a IV-a, Editura Polirom, 2014, ISBN: 978-973-46-4430-8;
8. Stăncescu C., *Modelare parametrică și adaptivă cu Inventor*, ediția a II-a, Editura Fast, 2014;
9. Bi Z., Wang X., *Computer Aided Design and Manufacturing*, Editura John Wiley & Sons Ltd, 2020 (e-nformation);
10. Morling K., *Geometric and Engineering Drawing*, 3th , Butterwort-Heinemann, Elsevier Ltd., 2010;
11. Simmons C.H., Maguire D.E., *Manual of Engineering Drawing*, Second edition, Elsevier Newnes, 2004;

8.2. Laboratory	Teaching methods	Observation
L.1. L.1. Safety rules. AutoCAD design environment. Application 2D-4 (Reduction) from [1];	Practical applications from references [1] and [2], created using AutoCAD and SolidWorks	2 hours
L.2. Applications 2D-5 (Grooved bushing) and 2D-6 (Indexing mechanism plate) from [1];		2 hours
L.3. Applications 2D-9 (Bolt) and 2D-10 (Stamped plate) from [1];		2 hours
L.4. Applications 2D-11 (Half-plate) and 2D-12 (Seal) in [1];		2 hours

L.5. L.5. Applications 2D-14 (Arm joint) and 2D-16 (Tubing) in [1];	respectively.	2 hours
L.6. Applications 2D-17 (Guide bracket) and 2D-18 (Hook) from [1];		2 hours
L.7. Representation of a front panel signaling wiring diagram for MS 810KW; Lab Test 1 (2D CAD application).		2 hours
L.8. 3D Radial bearing modelling (application 1 in [2]);		2 hours
L.9. 3D Flange and Fork modelling (applications 2 and 3 in [2]);		2 hours
L10 3D Modeling of Mobile Jaw and Inclined Guide (applications 4 and 5 of [2]):		2 hours
L.11. 3D modelling and generation drawing of foot pedal (application 6 in [2]);		2 hours
L.12. 3D modelling and generation of drawing of the Housing (application 7 of [2]);		2 hours
L.13. 3D modelling and generation of drawing of the Control wheel (application 9 [2]);		2 hours
L.14. Lab test 2 (3D CAD application); Final discussion. Conclusions of laboratory activity.		2 hours

Bibliography

1. Nedelcu D., Cojocaru V., *Grafică asistată de calculator prin AutoCAD*, Editura Eftimie Murgu, Reșița, 2010;
2. Cojocaru, V., Technical drawing and computer graphics III, laboratory support, online platform including support materials and video tutorials, available at https://sites.google.com/view/dti3.
3. Nedelcu, .D., *Proiectare și simulare numerică cu SolidWorks*, Editura Eurostampa, Timișoara, 2011;
4. Simion I., *Autocad 2011 pentru ingineri*, Editura Teora, București, 2011;
5. Stăncescu C., Album cu 100 piese mecanice, Editura Fast, București, 2017;

9. Corroborating Discipline's Contents with the Expectation of the Epistemic Community Representatives, the Professional Associations and the Employers' Representatives from the Programme Corresponding Field

The content of the course is reviewed with the main employers in periodical discussions on the evaluation of the study programme. 2D and/or 3D computer graphics is a fundamental tool in engineering activity. AutoCAD and SolidWorks software are widely used by industrial companies, nationally and internationally, and are also available to students. Knowledge of these software allows rapid learning of similar software (Catia, Autodesk Inventor, Creo, Simens NX, DraftSight).

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Weight from the final grade
10.4. Course	Debates participation	Number of interventions	10 %
	Level of knowledge acquired (ability to produce 2D drawings and 3D models according to specific requirements)	Oral exam (practical computer test with two topics: a 2D drawing in AutoCAD and a 3D model in SolidWorks)	60 %
10.5 Laboratory	Gained competence level in practice (ability to produce 2D drawings and 3D models according to specific requirements)	Evaluation of accuracy and timeliness of laboratory applications. Tests integrated into lab activities (one test in week 7 and one test in week 14)	30 %

10.6. Performance Minimum Standard

- Completion of laboratory work;
- Ability to represent in 2D and 3D CAD environments the basic geometrical elements in accordance with the indications;
- Students in arrears who have re-contracted the subject will be recognized for course/lab work undertaken in previous years.

Completion Date	Course Coordinator's Signature	Laboratory Coordinator's Signature
02.05.2022	Lect.dr.eng. Vasile Cojocaru	Lect.dr.eng. Vasile Cojocaru
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Department Endorsement Date

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Chief of Department Signature
Lect. dr. phys. Cornel Hațiegan

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