

SYLLABUS¹

1. Information about the program

1.1 Higher education institution	POLITEHNICA UNIVERSITY TIMIȘOARA
1.2 Faculty ² / Department ³	Electronics and Telecommunications / Applied Electronics
1.3 Chair	—
1.4 Field of study (name/code ⁴)	Electronic Engineering and Telecommunications / 100
1.5 Study cycle	LICENSE
1.6 Study program (name/code)/Qualification	Applied Electronics / 10 / Applied Electronics

2. Information about the discipline

2.1 Name of discipline	Materials Science (for electronics)						
2.2 Coordinator (holder) of course activities	Conf.dr.ing. Adrian Popovici						
2.3 Coordinator (holder) of applied activities ⁵	Conf.dr.ing. Adrian Popovici, As.dr.ing. Ramona Mutiu						
2.4 Year of study ⁶	1	2.5 Semester	2	2.6 Type of evaluation	E	2.7 Type of discipline	obligatory

3. Total estimated time (hours / semester of didactic activities)

3.1 No. of hrs. / week	4 , of which:	3.2 course	2	3.3 seminar/laboratory/ project/training	2
3.4 Total no. of hrs. in the education curricula	56 , of which:	3.5 course	28	3.6 applied activities	28
3.7 Distribution of time for individual activities related to the discipline					hrs.
Study using a manual, course materials, bibliography and lecture notes					8
Additional documentation in the library, on specialized electronic platforms and on the field					8
Preparation for seminars / laboratories, homeworks, assignments, portfolios, and essays					8
Tutoring					8
Examinations					3
Other activities					
Total hrs. of individual activities					35
3.8 Total hrs. / semester ⁷	91				
3.9 No. of credits	4				

4. Prerequisites (where applicable)

4.1 Curriculum	• Mathematics, Physics
4.2 Competencies	•

5. Conditions (where applicable)

5.1 of the course	•
5.2 to conduct practical activities	•

¹ The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).

² The name of the faculty which manages the educational curriculum to which the discipline belongs.

³ The name of the department entrusted with the discipline, and to which the course coordinator / holder belongs.

⁴ Fill in the code provided in GD no. 493/17.07.2013.

⁵ The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

⁶ The year of study to which the discipline is provided in the curriculum.

⁷ It is obtained by summing up the number of hrs. from 3.4 and 3.7.

6. Specific competencies acquired

Professional competencies ⁸	<ul style="list-style-type: none"> • Using fundamentals • relating to devices, circuits, • systems, instrumentation and • electronic technology
Transversal competencies	<ul style="list-style-type: none"> •

7. Objectives of the discipline (based on the grid of specific competencies acquired)

7.1 General objective of the discipline	<ul style="list-style-type: none"> • The course provides basic theoretical and practical knowledge on materials and components used in electronics and electronic technology. The components are studied with emphasis on functional description, production technology and specific parameters.
7.2 Specific objectives	<ul style="list-style-type: none"> • Using fundamental elements relating to the circuits, systems, instrumentation and electronic technology. The design and use of hardware and software applications specific for low complexity applied electronics. Methodical analysis of the problems encountered in work, identifying items for which there are dedicated solutions, thus ensuring professional tasks. Adapting to new technologies, professional and personal development through continuing education using printed documentation sources, specialized software and electronic. Solving problems in the areas of applied electronics technology

8. Content

8.1 Course	No. of hours	Teaching methods
1. Introduction	1	Exposition, lecture, conversation, explanation, eg., presentation slides, demonstrations blackboard discussions with students
2. Dielectric materials and applications	8	
3. Magnetic materials and applications	8	
4. Conductor materials and applications	3	
5. Semiconductor materials and applications	8	

⁸ The professional competencies and the transversal competencies will be treated according to the Methodology of OMECTS 5703/18.12.2011. The competencies listed in the National Register of Qualifications in Higher Education [Registrul Național al Calificărilor din Învățământul Superior RNCIS] (http://www.rncis.ro/portal/page?_pageid=117_70218&_dad=portal&_schema=PORTAL) will be used for the field of study from 1.4 and the program of study from 1.6 of this form, involving the discipline.

Bibliography⁹ Adrian Popovici , Dielectrics –intranet.etc.upt.ro, 2014

Adrian Popovici , Magnetics –intranet.etc.upt.ro, 2014

Adrian Popovici , Conductors –intranet.etc.upt.ro, 2014

Adrian Popovici , Semiconductors –intranet.etc.upt.ro, 2014

D. Jiles, *Introduction to the Electronic Properties of Materials*, Chapman & Hall, London, 1994

V.M. Cătuneanu, *Materiale pentru electronică*, Editura didactică și pedagogică, București, 1982

Shugg, W. Tillar, *Handbook of electrical and electronic insulating materials*, 2nd ed., New York, IEEE Press, 1995

Jerry C. Whitaker , *The electronics handbook* 2nd ed., Taylor & Francis, 2005

Blackwell, Glenn R., *The electronic packaging handbook*, Florida, CRC Press LLC, 2000

McBrearty, Daniel, *Electronics calculations data handbook*, Oxford, Newnes, 1998

May, Gary S., *Fundamentals of semiconductor manufacturing and process*, Hoboken, N.J., IEEE Wiley-Interscience, 2006

Gilman, John J., *Electronic basis of the strength of materials*, Cambridge, Cambridge University Press, 2003

Jiles, David, *Introduction to the electronic properties of materials*, 2nd ed., Cheltenham, Nelson Thornes, 2001

Greig William J., *Integrated circuit packaging, assembly and interconnections*, New York, Springer, 2007

Charles A. Harper , *Electronic packaging and interconnection handbook* 4th ed., New York, McGraw-Hill, 2005

Leonard W. Schaper , *Integrated passive component technology* , IEEE Press Wiley-Interscience, 2003

Nilsson, James William, *Electric circuits*, Pearson Education International Prentice Hall, 2008

Zandman, Felix, *Resistor theory and technology*, SciTech, 2001

Richard K. Ulrich , Leonard W. Schaper , *Integrated passive component technology*, IEEE Press Wiley-Interscience, 2003

Spaldin, Nicola A., *Magnetic materials : Fundamentals and device applications*, Cambridge, University Press, 2003

Della Torre, Edward, *Magnetic hysteresis [resursă electronică]*, New York, IEEE Press, 1999

Jorgensen, Finn, *The complete handbook of magnetic recording*, 4th ed., New York, McGraw-Hill, 1996

Mee, Denis C., *Magnetic recording technology* / Denis C. Mee, Eric D. Daniel, 2nd ed, New York, McGraw-Hill, 1995

Wolfgang Schröter . *Electronic structure and properties of semiconductors*, 2008

Rockett, Angus, *The materials science of semiconductors*, New York, Springer, 2008

⁹ At least one title must belong to the department staff teaching the discipline, and at least 3 titles must refer to national and international works relevant for the discipline, and which can be found in the Politehnica University Library.

May, Gary S., Fundamentals of semiconductor manufacturing and process control, Interscience, 2006

Schroder, Dieter K., semiconductor material and device characterization, 3rd ed., IEEE Press Wiley, 2006

José Pineda de Gyvez , Integrated circuit manufacturability the art of process and design integration, IEEE Press Institute of Electrical and Electronics Engineers, 1999

J.D. Livingstone, Electronic Properties of Engineering Materials; Wiley, Massachusetts Institute of Technology, Cambridge, 1999

W. Bolton, Electrical and Magnetic Properties of Materials, Longman Scientific & Technical, Essex, 1992

P. Svasta, V. Golumbeanu, Noutăți în packagingul componentelor electronice pasive, Politehnica Press, București, 2001.

B. Van Zeghbroeck, Principles of Semiconductor Devices, University of Colorado, 2004

8.2 Applied activities ¹⁰	No. of hours	Teaching methods
Laboratory		Conversation, explanation, example, experiment, demonstration, comparative analysis, simulation, case study, brainstorming
Equipments used in electronics	2	
Computer simulation of the behavior of dielectric and magnetic materials	4	
The study of dielectric materials	4	
The study of magnetic materials	4	
Study of passive components used in electronics	4	
Influence of manufacturing tolerance Passive electronic components on the parameters of electronic circuits	4	
Applications of electronic materials	6	

Bibliography¹¹ Adrian Popovici , Dielectrics –intranet.etc.upt.ro, 2014

Adrian Popovici , Magnetics –intranet.etc.upt.ro, 2014

Adrian Popovici , Conductors –intranet.etc.upt.ro, 2014

Adrian Popovici , Semiconductors –intranet.etc.upt.ro, 2014

D. Jiles, *Introduction to the Electronic Properties of Materials*, Chapman & Hall, London, 1994

V.M. Cătuneanu, *Materiale pentru electronică*, Editura didactică și pedagogică, București, 1982

Vasile Cătuneanu , *Tehnologie electronică*, Ed. a 2-a, Editura Didactică și Pedagogică, 1984

Shugg, W. Tillar, Handbook of electrical and electronic insulating materials, 2nd ed., New York, IEEE Press, 1995

¹⁰ The types of applied activities are those specified in footnote 5. If the discipline contains several types of applied activities, then these will be written consecutively in the lines of the table below. The type of activity will be written in a distinct line, as „Seminar:”, „Laboratory:”, „Project:” and/or „Practice/Training:”.

¹¹ At least one title must belong to the staff teaching the discipline.

Jerry C. Whitaker , The electronics handbook 2nd ed., Taylor & Francis, 2005

Blackwell, Glenn R., The electronic packaging handbook, Florida, CRC Press LLC, 2000

McBrearty, Daniel, Electronics calculations data handbook, Oxford, Newnes, 1998

May, Gary S., Fundamentals of semiconductor manufacturing and process, Hoboken, N.J., IEEE Wiley-Interscience, 2006

Gilman, John J., Electronic basis of the strength of materials, Cambridge, Cambridge University Press, 2003

Jiles, David, Introduction to the electronic properties of materials, 2nd ed., Cheltenham, Nelson Thornes, 2001

Greig, William J., Integrated circuit packaging, assembly and interconnections, New York, Springer, 2007

Charles A. Harper , Electronic packaging and interconnection handbook 4th ed., New York, McGraw-Hill, 2005

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- Following the course titular contacts with representatives of the specialized companies in Timisoara the course content was discussed and mutually agreed. The focus is on the development of fundamental knowledge in electronics, documentation skills, development in electronics, developing collaborative skills for the development of a project

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share of the final grade
10.4 Course	Students participation in discussions related to the specific discipline	Students participation in discussions on specific topic	40% of the note activity
10.5 Applied activities	S:		
	L: Individual activity in laboratory classes	Weekly testing knowledge within laboratory hours	60% of the note activity
	P:		
	Pr:		

- 10.6** Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)
- Written exam, theoretical subjects and solving specific applications. The final grade results as an average between final examination (50%) and note the overall activities (50%) Duration: 3:00
4 questions / topics covering theoretical / applications in relation 1/1;
Examination room is set by the Dean
 - To pass discipline it is necessary to know the main characteristics of the materials used in electronics, their main applications and to know how to calculate the parameters required for a specific application

Date of completion

**Course coordinator
(signature)**

**Coordinator of applied activities
(signature)**

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**Head of Department
(signature)**

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**Date of approval in the Faculty
Council¹²**

**Dean
(signature)**

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¹² Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparține programul de studiu cu privire la fișa disciplinei.