Syllabus

1. Information about the **Module 1**

1.1 University	Politehnica University of Timişoara
1.2 Team	UPT_Team
1.3 Trainer_Name	Associate Professor Anca Drăghici Associate Professor Carmen Sticlaru
1.3 Degree level	Postuniversitary degree

2. Information about the course

Module title	**Introduction to 3D Printing Technologies in Libraries**

3. Time budget

3.1 Number of hours	**3 h**	divided in:	Lecture	**100 mins**	Laboratory/ Project	**80 mins**
3.2 Time budget distribution (hours) for individual activity:						
(a) Individual study (course, obligatory bibliography, etc.)						1
(b) Additional documentation (recommended bibliography, etc.)						0.5
(c) Preparation for seminary/laboratory/project activities						0.5
(d) Peer learning						0
(e) Exam preparation						0
(f) Other activities						0
3.3 Total individual study (sum (3.7(a)...3.7(f)))					**2 h**	
3.4 ECTS credits					**0.2**	

4. Preconditions

4.1 curriculum	Librarian
4.2 competences	Space vision, technical skills, computer using knowledge

5. Course requirement

5.1. for lecture	Lecture room with video projector, laptop
5.2. for seminary/ laboratory/ project	Laboratory room with video projector, laptop, 3D printers

6. Gained competences

Professional competences	1. Explaining concepts specific processes and solving engineering problems phased expert on mathematical algorithms and basic knowledge of mechanics 2. Develop technical project execution for partial assemblies basic 3. Competences in organizing new services in libraries 4. Competences in managing a Makerspaces in libraries
Transversal competenc	1. Familiarity with specific roles and teamwork activities and distributing tasks to subordinate levels 2. Familiarity with new business models in libraries

7. Course objective

7.1 General objective	Systems analysis, designing and manufacturing 3D printed assemblies
7.2 Specific objectives	Learners should be able to: - understand how AM differs from subtractive manufacturing; - describe the flow and stages of the AM process; - relate AM to specific manufacturing needs and fields of interest; - describe how the use of 3d Printing will be beneficial; - facilitate the production process and increase output. - developing rules for new library services

8. Contents

8.1 Lecture	Hours	Teaching methods	Observation
Introduction to 3D Printing Technologies in Libraries		Video projector exposure methods, whiteboard explanations and discussions	
1.1 The role of libraries and 3D Printing	15 mins		
• Best practices of 3D Printing in Libraries			
1.2 Towards Digital Literacy: 3D Printing and Makerspaces in Libraries	15 mins		
• Best Practices of Makerspaces in Libraries			
1.3 Library Policy for 3D Printing	15 mins		

• 3D Printing Rules for the library users			
1.4 General Description of the Manufacturing Principles	20 mins		
• What is additive Manufacturing			
1.5 Advantages of the Additive Manufacturing	35 mins		
• Complexity of Manufacturing			
• Less waste			
• Materials			
• Lead time and design			
• Cost saving			
8.2 Seminary / Laboratory / Project	Hours	Teaching methods	Observation
Introduction to 3D Printing Technologies in Libraries		Video projector exposure methods, whiteboard explanations and discussions	
1.1 The role of libraries and 3D Printing	15 mins		
• Best practices of 3D Printing in Libraries			
1.2 Towards Digital Literacy: 3D Printing and Makerspaces in Libraries	15 mins		
• Best Practices of Makerspaces in Libraries			
1.3 Library Policy for 3D Printing	15 mins		
• 3D Printing Rules for the library users			
1.4 General Description of the Manufacturing Principles	20 mins		
• What is additive Manufacturing			
1.5 Advantages of the Additive Manufacturing	15 mins		
• Complexity of Manufacturing			
• Less waste			
• Materials			
• Lead time and design			
• Cost saving			
8. 3 Bibliography:			

[1] Ford, S., & Minshall, T. (2019). Invited review article: Where and how 3D printing is used in teaching and education. Additive Manufacturing, 25, 131-150.Hall, S., Grant, G., Arora, D., Karaksha, A., McFarland, A., Lohning, A., & Anoopkumar-Dukie, S. (2017). A pilot study assessing the value of 3D printed molecular modelling tools for pharmacy student education. Currents in Pharmacy Teaching and Learning, 9(4), 723-728., https://doi.org/10.1016/j.cptl.2017.03.029 Marschall, 2016

[2] Wohlers et al., (2019). Wohlers Report 2019: The 3D Printing and Additive Manufacturing State of the Industry. Wohlers Associates (ISBN 978-0-9913332-5-7). https://wohlersassociates.com/2019report.htm

[3] Draghici A., Sticlaru C., Lovasz A. & Ivascu L. (2021a). A Proposed Model for 3D Printing Education in the University, In Proceedings of the 26th International Conference on Production Research (ICPR 2021) - Intelligent and Transformative Production in Pandemic Times, Taichung, Taiwan, to be published.

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[11] The Fab Lab Network community, https://fabfoundation.org/global-community/ (Access 13-07-2021)

[12] Motyl, B., & Filippi, S. (2020). Trends in engineering education for additive manufacturing in the industry 4.0 era: a systematic literature review. International Journal on Interactive Design and Manufacturing (IJIDeM), 1-4.

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[15] 3D_Printing_Handbook-Sample.pdf from 3DHub
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[17] 3D_Printing_The_Definitive_Guide.pdf, (Access 15-02-2021).
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9. Evaluation at the end of the course