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HEI MAKERS

O4 TETC TRAINING PROGRAMME AS HEI'S SUMMER SCHOOL

SUNRISE VALLEY
SCIENCE AND TECHNOLOGY PARK

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Contents

Proposed Training Plan

Objectives of Training

The HEI MAKERS Summer School training programme has the following objectives:

- Increase knowledge in technical entrepreneurship and technical creativity in 3D printing
- Improve Transversal competencies such as communication in foreign language, digital and social competencies, cultural awareness and sense of initiative of both students and teachers
- Improve ability to apply theoretical knowledge in entrepreneurship and 3D printing to practical tasks

The aim of these objectives is to test the concept of HEI and Makerspace collaboration using the modules on technical entrepreneurship and technical creativity developed throughout the programme.

The HEI MAKERS mission is to improve innovation and creativity skills of graduates by providing new teaching methods in higher education institutions and open resources for formal and non-formal education. Therefore, training should be addressing the students as well as the teachers to adapt their teaching methodologies to promote innovation and creativity in their students.

Development Process

This training programme will consist of a schedule of lesson activities and workshop activities with the intended training goals, learning objectives, methods and trainer profiles. The training process for this programme is shown in figure 1.

The key elements of the training programme will include learning modules for lectures and for online learning in which theoretical concepts are taught, students will be given assignments and they will have the opportunity to apply their knowledge into practical workshops. As the participants will be in higher education with good English skills and some technical knowledge, the aims and objectives of each module will be catered towards their level.

To develop the content for the programme, multiple university professors and students were interviewed to discuss various topics regarding this collaboration between HEIs and Makerspaces e.g. their current understanding and experience with makerspaces. Through the information gathered from these interviews and the specialised expertise of the partners, the appropriate subjects and learning objectives were identified.

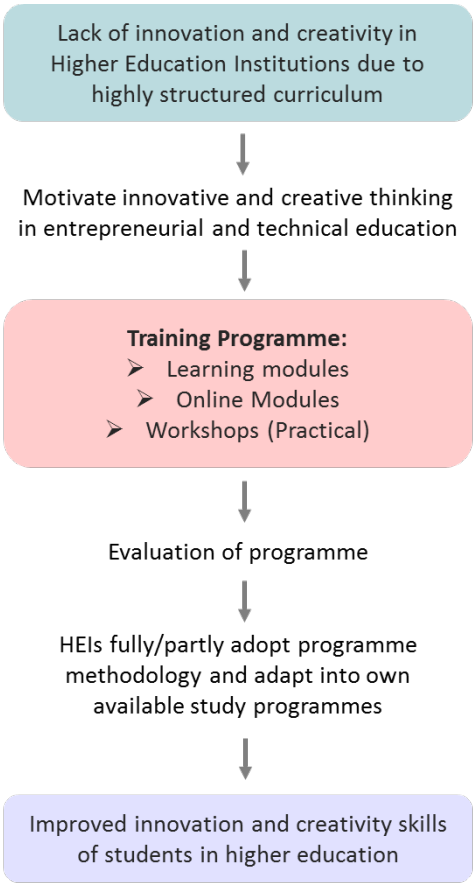

Figure 1. The training programme development process and the after-effects

Programme Design and Structure

The programme was designed to develop the participants' theoretical and practical knowledge through traditional and independent learning sessions. The HEI Makers programme will have three types of sessions:

- Lecture based sessions- students will be introduced to the two main learning topics, **technical entrepreneurship** and **3D printing**. There will be various modules for each topic to introduce to the students the key features of successful entrepreneurship and the background into 3D printing technologies. These sessions will typically be held during the mornings.
- Online learning sessions- Students will have access to various content that will provide further information regarding the content in the Lectures. These sessions will improve the students independent learning skills and reinforce the knowledge they gained from the lectures.
- Workshop sessions- Students will be given the opportunity to apply their knowledge into practical tasks involving entrepreneurship and 3D printing. This will allow them to better understand the concepts by developing their tacit knowledge.

Introduction

Students

Dear student,

We are now heading towards the new industrial revolution that will exponentially alter all disciplines, industries and economies. Smart technologies will be the key driver in industry 4.0 as global industries and factories start implementing them into their workflow. This will boost the productivity and value added to the global industries and stimulate economic growth. Furthermore, technological innovations will open new markets and offer huge opportunities for people and companies. One such example of disruptive technology shaping the fourth industrial revolution is 3D printing. Due to the current advancement in 3D printing technologies, mass personalisation and mass production of products through digital processes could become the future of manufacturing.

In this programme you will have the opportunity to discover the fundamentals of technological entrepreneurship and understand how ideas can be successfully developed into businesses. In addition, you will gain an insight into 3D printing processes and will be given the opportunity to design, model and produce your own product. We hope this programme will encourage you to learn more about entrepreneurship and 3D printing and be able to apply your new skills to your education and future careers.

Teachers

Dear Teacher,

Please see below for a short description of the different teaching methodologies you can adopt in your lessons to ensure effective learning takes place.

Stage 1- Engagement

- *Prepare students for the lesson by first introducing the main objectives and aims. Teacher could also utilise this time to comment on previous lessons and how they are linked to the current one to allow for a smooth transition. Explain and analyse the objectives so that the students will know exactly what is expected of them and what they should focus on during the programme. Some of the teaching strategies of stage 1 is to trigger interest in the students, offer discussions and conduct brainstorming sessions.*

Stage 2- Exploration

- *Guided exploration of specific concepts so that the students can acquire the relevant knowledge and skills. The learning process should always be balanced out between you and the students i.e. students should be given the opportunity to engage with the material by discussion sessions. However, you also need to gradually guide the class discussion or activity where it needs to go while simultaneously letting the class momentum proceed without too much overt interference.*

Stage 3- Investigation

- *Students should be given the opportunity to plan and perform investigations into each concept. There should not be a constant influx of information. Students should be given tasks in which they have to think for themselves and present their ideas to the class. These activities will improve the learners' problem-solving skills and also allow them to apply what they have learnt to different scenarios.*

Stage 4- Creation

- *Similar to Stage 3, students should be given the opportunity to conduct independent research by applying the theoretical knowledge into practice. By allowing the students to carry out individual projects, this will encourage them to think independently and improve their creativity skills. This will ensure that there isn't a complete dependence on the teachers.*

Stage 5- Evaluation

- *After student presentations, teachers should be able to identify the students' progression level, the areas that need improvement and provide feedback. Students could also be encouraged to conduct self-evaluation and peer evaluation of groups and individuals. Through this method, learning is enhanced as students can learn from the mistakes and successes of others.*

List of tools to use in the class to make it more interactive:

- *Videos*
- *Case studies*
- *Games related to the topic*
- *Use the technology*
- *Try to give further information, not only classroom material*
- *Give students a choice (find out what is the best learning method for them)*

Programme Outline

Description

Table 1. Description of the overall programme

MODULE	Technical Creativity in 3D Printing
MODULE DESCRIPTION	This module is a learning material in which basic knowledge and skills related to the 3D printing industry are gained.
SESSION AIMS	The lecture sessions will have the following aims: - Students will be acquainted with the fundamentals of 3D printing and the importance of it. - Students will learn the basic terms and definitions related to 3D printing technology. - Students will learn the process parameters behind 3D printing. - Students will become acquainted with 3D printing hardware and software systems. - Students will learn to analyse 3D printing parts defects. - Students will explore the strategies associated with entrepreneurship in 3D printing. - students will learn the main steps of 3D printing design
	The workshop sessions will have the following aims: - Students will link theoretical knowledge into producing a successful business development plan. - Students will carry out 3D modelling tasks for low to medium complexity parts. - Students will learn to create 3D models from 3D scanning. - Students will learn to apply 3D printing process steps for manufacturing. - Students will gain the practical knowledge required to develop a technical product suitable for 3D printing.
	The online learning sessions will have the following aims: - Students will learn the different methods they can adopt to improve their learning decision-making and discussion skills. - Students will be introduced to different thinking styles to optimise their thought processes. - Students will gain in depth knowledge regarding the entrepreneurship steps **Update according to the uploaded content**

Lecture Topic Outcomes

The tables below will show an overview of the lecture modules for the topics, the units within each module and the expected learning outcomes. Detailed description of the modules will be given in the next section.

Table 2. Topic 1 - Basic Aspect of Entrepreneurship in technology

Learning Outcomes	Relevant Training units	Relevant training module
After completing module 1, students should know the processes behind entrepreneurship and the strategies they can employ to successfully develop their business idea in the technology sector.	Kickstarting your idea	1. Overview of Entrepreneurship
	Funding your idea	
	Developing your idea	
	Protecting your idea	
	Growing your business	
After completing module 2, students should also be able to identify the strategies the case study company used to develop their business and be able to link them to the content learnt in module 1.	Company overview	2. Case study – Carbon3D, Inc.
	Innovation	
	Funding	
	Collaborations	
	Business growth	

Table 3. Topic 2- The fundamentals of 3D Printing technologies

Learning Outcomes	Relevant Training units	Relevant training module
After completing module 1, students should efficiently use the vocabulary and terminology of 3D printing processes. They should also gain basic insight into how 3D printing can be carried out and the associated advantages and risks.	Definitions	1. Fundamentals of 3D printing
	3D printing processes and technologies	
	3D printing advantages and limitations	
	3D printing materials	
	3D printing work flow	
After completing module 2, students should be able to understand the detailed processes of 3D printing and how to optimize different parameters to ensure high quality production.	Part orientation: layer thickness	2. 3D printing process parameters
	Extrusion temperature	
	Raster pattern	
	Infill	
After completing module 3, student should become acquainted with the different types of 3D printing hardware and they should be able to identify their features and functions.	3D printer key componenets	3. 3D printing hardware
	3D printer motion control and design principles	
After completing module 4, students should know the	Slicers: Cura – interface	4. 3D printing software
	Main options	

different types of 3D printing software and the range of applications they can be used for.	Setting process parameters	
After completing module 5, students should have a basic knowledge required to produce good quality parts and understand why defects can occur. They should also be able to identify the causes for the defects in the case study examples.	Causes of defects in 3DP 3DP defects - Case studies	5. 3D printing parts defects analysis
After completing module 6, students should know the preliminary work required for 3D printing in terms of designing and making 3D models.	CAD & 3D printing Influences of 3D model over part strength/quality	6. Design for 3D printing

Workshop Outcomes

Table 4. Workshop Learning Outcomes

Learning Outcomes	Workshop Sessions
The aim of the workshop is to allow the students to design, develop and assess entrepreneurial concepts they learnt in the lectures. They will be able to work in teams to collaborate a business plan surrounding an idea related to the additive manufacturing industry and present their ideas	1. Dragon's den - Enterprise project
The aim of the workshop is to train the makers in using a 3D CAD software, namely CATIA V5, for modelling parts using specific tools and parameterization. Generative Surface Design module is also presented so that makers can acquire knowledge on how to create surface models. The second aim of the workshop is to teach makers how to use basic functions of Solidworks. This includes drawing simple sketches and using features like extruded boss/base and extruded cut.	2. 3D modelling low to medium complexity parts
TBA	3. 3D models from 3D scanning
The aim of the workshop is to equip makers with the practical knowledge needed to 3D print the components of their prototypes.	4. Applying 3D printing process steps for manufacturing
The aim of the workshop is to equip makers with the practical knowledge needed to develop a technical product suitable for 3D printing	5. 3D printing project

Online Learning Modules Outcomes

Table 5. Online Learning Modules Outcomes

Learning Outcomes	Online Sessions
The aim of the topic is to be able to identify the need for an innovative solution, generate alternative conceptual solutions, evaluate these solutions and also implement them.	1. Technological innovations
The aim of this topic is to use novel tools to enrich the entrepreneurial activity with innovations using current technologies.	2. Creativity essentials
The aim of this topic is to use individual profiles to compose an effective founding team.	3. Identity founding team
Aim of the topic is to show the basis of sustainable attitude towards circle economy, business foot print, "take-make-waste" dilemma and sustainable goals development.	4. Sustainable solutions
The aim of this module is to familiarize learners, HEI students and lecturers, with basic knowledge and real case examples on launching a hardware-based start-up and prepare for generating ideas on how to start a business based on own prototype.	5. Technological Entrepreneurship
The aim of this module is to understand what a business model is, and the different factors involved to produce a successful business plan	6. Lean Business canvas workshop
Understand whole Brain® Thinking is a methodology designed to help thinkers, teams and organizations gain better benefits from all of the thinking available to them	7. Hermann Thinking Style Test

Lecture Topic 1: Entrepreneurship

Session 1: Overview of Entrepreneurship

Aims:

Kickstarting your idea

Learn about the mechanisms for developing and growing an idea, helping you kick-start your business.

Funding your idea

- Learn to determine what is expected of a business relative to financial support, strategy in finance.
- Learn about the sources of funding available to entrepreneurs and the importance of networking.

Developing your idea

- Learn about the importance of stakeholders and how to effectively engage with them to meet the needs of the business

Protecting your idea

- Learn about the importance of protecting an idea or product with legislation.

Growing your business

- Learn more in-depth strategies for approaching legislative requirements for products and services.
- Learn to identify a suitable route for business growth.

Learning Objectives:

The focus of this section is to encourage more in-depth thinking relative to a business idea and highlight the key steps in ensuring a successful development.

Kickstarting your idea

- Recalling methods to advance your idea, understanding of business incubators and accelerators.

Funding your idea

- Able to focus business towards a particular group of people on the basis of funding.
- Understanding of key funding sources and how to select the most appropriate relative to the needs of the business.

Developing your idea

- Understanding of the key principles and benefits of stakeholder engagement.

Protecting your idea

- Obtain knowledge of IP protection in terms of patents, copyright, designs, trademarks, and trade secrets
- Being able to select the appropriate method of protection for your product on the basis of what has been learnt.

Growing your business

- Identification of key strategies for growing business and the challenges associated with them.

Methodology:

Presentation – PowerPoint slides will be used to present the curriculum and concepts to students

Examples – Actual examples of routes into entrepreneurship

Videos – YouTube videos relating to entrepreneurship will be shown between lesson

Discussion – Carry out active conversations with the students regarding any ideas they may have towards starting a business

Session 2: Case Study (Carbon3D, Inc.)

Aims:

Company overview

- Learn about the background information regarding the company and its founders

Innovation

- Learn about the company's innovation and process behind it

Funding

- Learn about the amount of funding the company has raised since their establishment

Collaborations

- Learn about the different companies Carbon has collaborated with and the products they have produced

Business growth

- Learn about how Carbon is growing their business by new product launch

Learning Objectives:

The focus of this section to link a real-life example of a 3D printing company's route in entrepreneurship and the strategies they employed to establish their business to the content in session 1.

Company overview

- To gain an insight into the motivation behind the company and the types of services they provide

Innovation

- To understand the process behind CLIP and the four development steps

Funding

- To know the amount and the type of funding Carbon has raised within the last 7 years

Collaborations

- To gain insight into the collaborations between Carbon and Adidas and dental companies.

Business growth

- To understand Carbon's current growth strategy and the types of new products they are releasing

Methodology:

Presentation – PowerPoint slides will be used to present the curriculum and concepts to students

Video – YouTube video to show how CLIP works in theory and in action

Examples- Examples of 3D printed parts using Carbon's 3D technology that have been used to produce commercial products so that the students will gain an understanding of the wide array of applications of 3D printing

Lecture Topic 2: 3D Printing Technologies

Session 1: Fundamentals of 3D Printing

Aims:

Definitions

- Learn about the most relevant definitions related to 3D printing (3DP)

3D printing processes and technologies

- Learn about the existing 3D printing processes and technologies

3D printing advantages and limitations

- Learn about the main advantages offered by 3DP as well as the limitations

3D printing materials

- Learn about the various materials used in 3DP.

3D printing work flow

- Learn about the different steps in the 3DP workflow

Learning Objectives:

Definitions

- Understanding the most relevant terms used in 3DP

3D printing processes and technologies

- Gain basic knowledge about the main 3DP processes and technologies, with a focus on the technologies most accessible for makerspaces (FDM and SLA)

3D printing advantages and limitations

- Gain basic knowledge needed to evaluate the opportunity of using 3DP for making different parts of your prototype.

3D printing materials

- Gain basic knowledge needed to select the right material for making different parts of your prototype.

3D printing work flow

- Gain basic knowledge about the operations to be done in order to obtain the 3D printed parts needed for your prototype.

Methodology:

Presentation – PowerPoint slides will be used to present the curriculum and concepts to students

Videos – Showing the 3D printing processes in action

Examples – Examples of objects, technical parts and assemblies

Session 2: 3D Printing Process Parameters

Aims:

3D Printing orientation

- Learn how 3D printing (3DP) orientation impacts part accuracy, mechanical properties, time and cost, etc.

Process parameters in 3D Printing

- Learn about 3D Printing (3DP) process parameters.

Learning Objectives:

3D Printing orientation

- Be able to optimize 3DP prints orientation relative to given criteria.

Process parameters in 3D Printing

- Be able to identify and set process parameters in 3DP printing software.

Methodology:

Presentation – PowerPoint slides will be used to present the curriculum and concepts to students

Videos – TBA

Examples – Examples of objects showing the influence of different process parameters over accuracy, surface quality and strength

Session 3: 3D Printing Hardware:

Aims:

Key Components

- To learn about the key components involved in 3D printing including the most important components of FDM/FFF 3D printer and their variations

Motion control and design principles

- To learn about 3D printer motion control and design principles including how an FDM/FFF 3D printer moves; variations of Cartesian and Delta printer

Learning Objectives:

Key Components

- Be able to identify the most important components that most popular 3D printers are made of, how they function and how different choices of components affect 3D printing results

Motion controls and design principles

- Gain insight into the motion control side of 3D printer design and their working principles and different types of 3D printer designs

Methodology:

Presentation – PowerPoint slides will be used to present the curriculum and concepts to students

Videos – Heated printing bed failure example, how polar 3D printer works

Examples – Examples of 3D printers and 3d printing parts

Session 4: 3D Printing Parts Defects Analysis

Aims:

Causes of defects in 3DP

- Learn about the causes of the defects encountered in FDM 3D printing

3DP defects - Case studies

- Learn about the various defects encountered in FDM 3D printing

Learning Objectives:

Causes of defects in 3DP

- Gain basic knowledge needed to obtain good quality parts from a FDM 3D printer

3DP defects - Case studies

- Gain Basic knowledge needed to obtain good quality parts from a FDM 3D printer.

Methodology:

Presentation – PowerPoint slides will be used to present the curriculum and concepts to students

Examples – Examples of defective 3D printed parts

Examples – Examples of objects showing the influence of different process parameters over accuracy, surface quality and strength

Session 5: Design For 3D Printing

Aims:

Design for Additive Manufacturing concept

- Learn about the importance of knowing and applying design rules for obtaining a good 3D print.

Examples of rules of design for 3D Printing

- Learn about the examples of rules of design for 3D printing

Learning Objectives:

Design for Additive Manufacturing concept

- Gain knowledge on how to design a part so that to benefit the advantages of 3D Printing.

Examples of rules of design for 3D Printing

- Become familiar with the 6 rules of design for 3D printing and be able to apply this to the hands-on activity

Methodology:

Presentation – PowerPoint slides will be used to present the curriculum and concepts to students

Videos – Videos of SLS, FDM and SLA processes

Hands-on Activity - Design a maze and prescribe and discuss the parameters of the design using the concepts

Workshop Sessions

Dragon's Den – Enterprise Project

Students will form into business units and the task is to design and market a product related to the 3D printing manufacturing industry. They will then present their ideas. The students will have to discuss and present the following information regarding their business:

- Company info – name, structure, objectives
- Idea/Product info- what is your product, why did you come up with this idea, what unmet needs are you satisfying, how will you produce the product, product price, etc.
- The industry or market segment you want to sell it into
- Funding strategies
- How will you develop and protect your product?
- How does it have a global potential?
- Business growth strategies

When presenting, the workshop leaders will be looking for the following competencies:

- Ability to combine everyone's ideas and be able to utilise the team talents
- Creativity when addressing the product/service
- Organisational skills and the ability to keep to time
- Confidence when presenting
- Clarity of strategy and presentation

3D Modelling Low to Medium Complexity Parts

The universities will demonstrate the CAD software that they use in their facilities. Students will use this software to produce 2D drawings of objects for the preparation of 3D modelling.

The Politehnica University of Bucharest will be focusing on the 3D CAD software known as CATVIA V5. Students will be modelling two designs for which a walkthrough document will be available comprising of the step by step process of producing the models. The two design for this 3D modelling and parametrizing task will be a box and a bottle using Generative Surface Design workbench.

The Riga Technical University will be focusing on the 3D CAD software known as Solidworks. Students will be modelling a simple spacer that can be used to hold a screw with a polygon head. The single CAD model with be created using the Part Mode of the software. Students will become familiar with the different features and tools available in the Part Mode.

3D models from 3D scanning

Introduce to the students with the 3D scanning technologies and process and teach them to prepare a scanned 3D model for 3D printing. The essential resources required for this workshop includes:

- 3D Scanner
- Camera
- Blender
- Netfabb
- Context Capture software

Applying 3D Printing Process Steps for Manufacturing

Ludor Engineering will teach the students to apply the theoretical knowledge gained from the lectures regarding the 3D printing processes to manufacture different technical parts and assemblies. They will equip makers with the practical knowledge needed to 3D print the components of their prototypes.

The resources and tools required for this workshop includes:

- STL file of the 3D model to be printed
- 3D Slicer Software
- FDM 3D printer
- PLA filament,
- Tools for part post-processing

The workflow of the workshop will be as follows:

- Use the STL file of the model students have made during the previous workshops
- Slice the model
- Print the model
- Finish the part
- Final product

Applying 3D Printing Process Steps for Manufacturing

Participants will choose a project topic (not on Moodle)- a technical product that can be suitable for 3DP and produce the following information:

- Problem statement
- Analysis and specifications list
- Concept drawings
- 3D modelling
- 3D printing process
- videos and good practices

This will equip makers with the practical knowledge needed to develop a technical product suitable for 3D printing.

The resources and tools required for this workshop includes:

- Computer
- Internet
- CAD software
- 3D Slicer Software
- FDM 3D printer
- Filament
- basic tools

Online Learning Modules

Technological Innovations

This topic will give an extensive overview of the different elements involved with technological innovations. The content will be supplemented with various case study examples and further research resource. After successful completion of this unit, students will be able to:

- Identify the need for an innovative solution, generate alternative conceptual solutions, evaluate these solutions and also implement them;
- Describe the basic elements of innovation and commercialisation;
- Appraise decision making responsibilities at the interface between business and innovation;
- Assess the dynamics of collaborative teams to work effectively within a team to accomplish tasks within given deadlines; and
- Explain start-up company pathways, including legal structures, legal obligations, taxation and bookkeeping, and ethnics and social responsibility issues etc.

Creativity essentials

Students will understand creativity is an active process necessarily involved in innovation. It is a learning habit that requires skill as well as specific understanding of the contexts in which creativity is being applied. The creative process is at the heart or art of innovation and often the words are used interchangeably.

Identity founding team

This topic will show the basis of Whole Brain Thinking, the HBDI® instrument which teaches individuals and teams how to communicate with those who think the same as you and those who think differently. Once an individual understands his or her thinking style preferences, the door is open to improved teamwork, leadership, customer relationships, creativity, problem solving, and other aspects of personal and interpersonal development.

Sustainable solutions

This module will be introducing make you aware of the importance of sustainability in a business setting. You will become be able to assess the sustainability of innovation projects and be able to make adjustments and come up with different strategies to optimise the sustainability levels.

Technological Entrepreneurship

The module focuses on technical start-ups rather than the usual ones teaching legal aspects and general business processes. It is based on successful entrepreneurship education schemes like Futurepreneurs, Fellows, Springboard and other projects. Technological entrepreneurship module

focuses on developing entrepreneurial mind-set, applying creative thinking techniques, creation and commercialization of hardware start-ups, internationalization, etc.

This module consists on the following units:

- Kickstarting your idea: business incubation/acceleration, start-up
- Funding your idea: Investors, funding sources
- Developing your idea: stakeholder mapping, stakeholder engagement
- Protecting your idea: intellectual property, copyrights, patents, trademarks, confidentiality
- Growing your business: scale-up, strategy, development

Business models (Lean canvas) workshop

This module will give an overview of the different strands and factors involved in producing a successful business mode. Students will be given lots of real-life examples of business models in the technological field which they can use when producing a business plan for their own ideas.

Herrmann thinking style test

Students will have the opportunity to complete various tests to determine their personality and thinking styles which will be useful when forming a diverse, cohesive and well-balanced team. They will gain a deeper insight into their thought processes and realise their strengths and weaknesses that they have never paid attention to before.

Programme Logistics (sample)

	Day 0 - Sunday	Day 1 - Monday	Day 2 - Tuesday	Day 3 - Wednesday	Day 4 - Thursday	Day 5 - Friday	Day 6 - Saturday
	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul
10:00	Arrivals	**Introduction Safety and organisational issues Country presentations** Room 2/07	Workshop 1: **Dragon's den enterprise project** Room 2/07 Lecturer:	Lesson 2: Fundamentals of 3D printing (pt 1) Room 2/07 Lecturer: Rihards Rieka	Workshop 2: 3D modelling low to medium complexity parts (pt 1) Room 2/07 Lecturer:	Lesson 4: **3D printing process parameters** Room 2/07 Lecturer:	Exploring Vilnius
11:00					Lesson 3: **3D printing parts defects analysis** Room 2/07 Lecturer:		
12:00							
13:00		Lunch					
14:00		Lesson 1: **Technological Entrepreneurship** Room 2/07 Lecturer: Laurynas Braskus	**Study visit**	Teambuilding - Project idea generation workshop Room 2/07 Mentor: Laurynas Braskus	Workshop 2: **3D modelling low to medium complexity parts (pt 2)** Room 2/07 Lecturer:	Workshop 3: **3D models from 3D scanning** Room 2/07 Lecturer:	
15:00							
16:00							
17:00							
18:00							Non-teaching days

	Day 7 - Sunday	Day 8 - Monday	Day 9 - Tuesday	Day 10 - Wednesday	Day 11 - Thursday	Day 12 - Friday	Day 13 - Saturday
	7-Jul	8-Jul	9-Jul	10-Jul	11-Jul	12-Jul	13-Jul
10:00	Exploring Vilnius	Lesson 5: **3D printing hardware** Room 2/07 Lecturer: Rihards Rieka	Lesson 6: **3D printing software** Room 2/07 Lecturer: Diana Popescu	**Team project work** Room 1/05, 2/07, 2/09, 2/13 Mentors: Diana, Rihards, Ricardas, Kristupas	**Team project work** Room 1/05, 2/07, 2/09, 2/13 Mentors: Diana, Rihards, Ricardas, Kristupas	**Pitch day** Room 2/07	Departures
11:00							
12:00			Lesson 7: **Design for 3D printing** Room 2/07 Lecturer:				
13:00		Lunch					
14:00		Workshop 4: **Applying 3D printing process steps for manufacturing** Room 2/07 Lecturer: Diana Popescu	**Team project work** Room 1/05, 2/07, 2/09, 2/13 mentors: Diana, Rihards, Ricardas, Kristupas	**Team project work** Room 1/05, 2/07, 2/09, 2/13 Mentors: Diana, Rihards, Ricardas, Kristupas	**Team project work** Room 1/05, 2/07, 2/09, 2/13 Mentors: Diana, Rihards, Ricardas, Kristupas	Pitch competition results; Feedback of summer school; conclusion of school; homework after summer school Room 2/07	
15:00							
16:00							
17:00							
18:00	Non-teaching days						

Evaluation Methodology

During the last session, students will be asked to fill out a feedback form from Google Survey. The answers to the form will provide insight into the effectiveness of the programme and whether the aims and objectives have been met. The question format of the survey could be set out in the following way:

1. Which Lessons and workshops did the participant attend?
2. Based on the question 1 answers, the student could be asked to rate each session from a scale of 1-10.
3. Provide statements about the programme and ask the student to rate them based on how much they agree with the statements. E.g. “The complexity of the content was appropriate” or “I am satisfied with the delivery of the session content”
4. Ask open ended questions about what the participants liked and disliked about each session
5. Ask to rate the programme as a whole and if they have suggestions to improve the summer school.
6. Ask whether they will recommend the summer school to friends or family or colleagues