# 3D-ReMath

# Curriculum of Part A
# "3D Printing Technology and Application"

| Session 1 | Introduction to basic 3D concepts |
|---|---|

**Description:**

The context of this session concerns the introduction of 3D sector, presenting information regarding the correspondent processes, i.e. modeling, rendering, scanning, printing. By this way, the audience will be aware on the application and several 3D techniques, in order the 3D printing, the discussed topic of this part, to be understandable. Consequently, main information concerning 3D printing, e.g. its benefits, will be discussed.

**Course Materials:** Description, Images, Video

| Session 2 | 3D Printing Generic Process |
|---|---|

**Description:**

The aim of this session is to train the audience on the process of printing, starting from the step of the appropriate 3D printing software and concluding with the printed object. The explanation of these steps supports the following sessions, as by delineating the whole flow of printing, the advanced information is possible to be comprehended.

**Course Materials:** Description, Images, Video

| Session 3 | 3D Printing Principles |
|---|---|

**Description:**

In order to have the best 3D printed objects, some rules are recommended and should be followed. These are analysed in this session, aiming to be absorbed by the audience and used during the preparation of 3D printing.

**Course Materials:** Description, Images, Video

| Session 4 | 3D Printing Materials |
|---|---|

**Description:**

The capacities of the 3D printing cannot be independent of the used materials. Wide variety of materials are offered to create objects, such as jewels and several cases, while they differ in their use, texture etc. In this session the categories of 3D printing materials will be presented.

**Course Materials:** Description, Images, Video

| Session 5 | 3D Printing Techniques |
|---|---|

**Description:**

The goal of this session is to specify the basic features of a 3D printer as well as the processes that a user needs to get acquainted with, in order to accomplish succeeded 3D printing. There is a particularly wide range of 3D printers, which vary in features, capabilities and price range. It is critical that the preparatory procedures of the 3D printer, the settings of the slicer along with the design of the 3D model in first place, to be the required according to the type of printer.

**Course Materials:** Description, Images, Video

| Session 6 | 3D Printing Post-Process |
|---|---|

**Description:**

In this session, the Post-Processes of 3D printing will be presented. Specifically, it will be clarified in which cases these processes are needed, which kind of modifications could be applied. Additionally, some rules that protect the 3D objects will be given.

**Course Materials:** Description, Images, Video

| Session 7 | Common 3D Printing Problems |
|---|---|

**Description:**

In this session, the most common 3D printing errors and issues will be presented. The session aims in explaining the more usual sources of those issues (whether they were caused by the model's design, by the slicer, by the 3D printer's settings or by a third party-factor) and providing the best possible solutions. Furthermore, an overall sum-up of the 3D printing procedures, issues and solutions will be given in the form of FAQ.

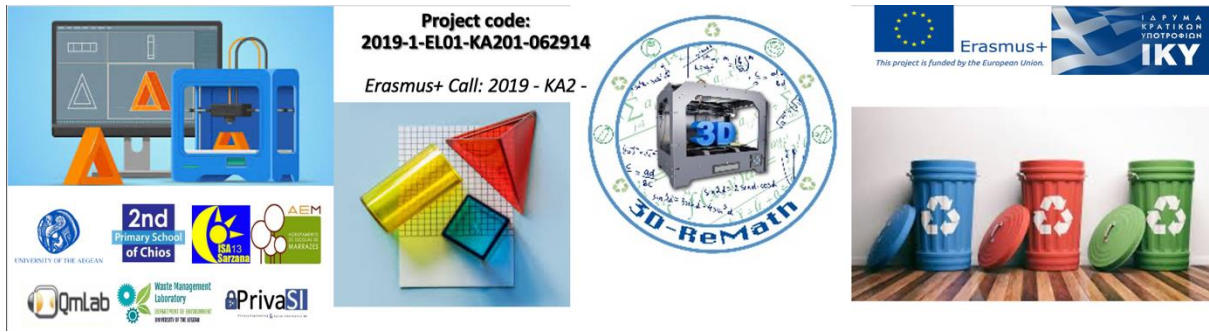**Course Materials:** Description, Images, Video

| Session 8 | 3D Printing Applications |
|---|---|

**Description:**

In recent years, with improvements and variations in the technologies of both the machines and materials used in them, costs have been coming down, making 3D printing more accessible and cost-effective, in industry and education. In this session, the applications of the 3D printing will be given along with its offered benefits for each field.

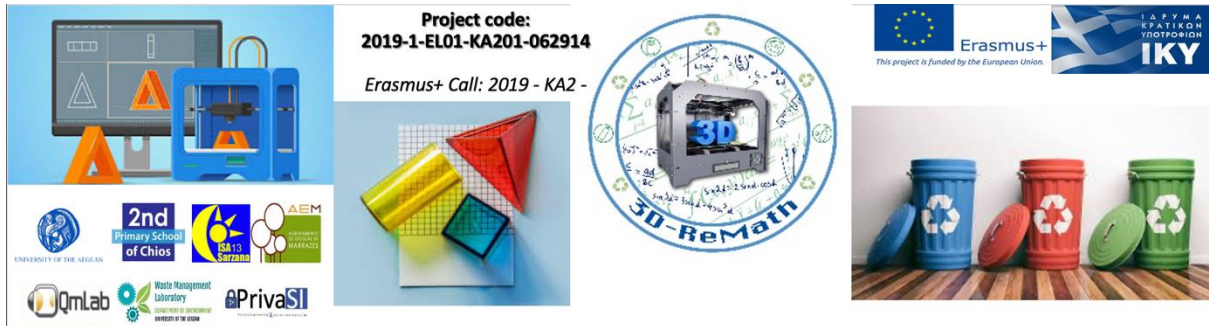**Course Materials:** Description, Images, Video

# 3D-ReMath

# Curriculum of Part B
# "Digital Sketching"

| Session 1 | Basic Tools & SketchUp Installation |
|---|---|
| **Description:** | |
| In this lesson we learn how to set up our workspace for the following lessons. First, we learn about popular 3D modeling software used for 3D printing. Then we learn how to install SketchUp, a popular free choice. We learn how to create an account for SketchUp, and then how to download and install the software. Finally, we take a first look at SketchUp's interface by opening a demo project. | |
| **Course Materials:** SketchUp Make 2017 exe file (download from sketchup.com), SketchUp Web Version (app.sketchup.com) | |
| Session 2 | User Interface & Tools |
| **Description:** | |
| In this lesson we take a deeper look at SketchUp's user interface. We learn about the way the interface is divided into useful sections, and what kind of information each section contains. Then we take a closer look some basic tools and their functionality. These tools include: Select, Eraser, Rectangle, Circle, Push/Pull, Move, Orbit and Pan. | |
| **Course Materials:** SketchUp Web Version (app.sketchup.com) | |
| Session 3 | Making 2D Shapes / Line Tool |
| **Description:** | |
| In this lesson we learn how to draw basic 2D shapes. We learn how to use the line & shape tools by drawing lines, rectangles, circles and arcs. | |
| **Course Materials:** SketchUp Web Version (app.sketchup.com) | |
| Session 4 | Making 3D Shapes / Push Pull Tool |
| **Description:** | |
| In this lesson we learn how to turn 2D objects into 3D. By using the Push/Pull Tool, we turn the 2D shapes we created on the previous version into 3D. We also learn how to cut holes into 3D objects, by utilizing the same tool. | |
| **Course Materials:** SketchUp Web Version (app.sketchup.com) and files from the previous lesson | |
| Session 5 | Modeling a Simple Object - Part 1 |
| **Description:** | |
| In this lesson we learn how to model a simple 3D object and customize it to our liking. We model a simple house by drawing a 2D layout and turning it into 3D with the Push/Pull Tool. We then use the same tool to add a door and windows. | |
| **Course Materials:** SketchUp Web Version (app.sketchup.com) | |
| Session 6 | Modeling a Simple Object - Part 2 |
| **Description:** | |
| In this lesson we continue modelling our house by adding a roof and chimney. We learn how to move things around using the Move tool, and how to combine different objects. | |
| **Course Materials:** SketchUp Web Version (app.sketchup.com) and files from the previous lesson | |

| Session 7 | Finding Models Online |
| --- | --- |
| **Description:** | |
| We learn how to search for websites like Thingiverse to find 3D models. We also learn how to download .zip files, extract them and preview the 3D models on our computer. | |
| **Course Materials:** Windows 10 and access to thingiverse.com | |
| Session 8 | Modifying Existing Models |
| **Description:** | |
| In this lesson we learn how to customize 3D models found on the Internet. We download a 3D model from Thingiverse, import it into SketchUp and customize it by adding our name, using the Text Tool. | |
| **Course Materials:** SketchUp Web Version (app.sketchup.com) and access to thingiverse.com | |

# 3D-ReMath

# Curriculum of Part C
# "Open Source S/W for Digital Files"

| Session 1 | Introduction to Slicing Software |
|---|---|
| **Description:** ||
| In this lesson we learn what slicer software does and why it is necessary in order to 3D print a file. We also learn the process of generating G-Code from .STL files and what G-Code is. ||
| **Course Materials:** Description, Images, Video ||
| Session 2 | The XYZ Slicing Software |
| **Description:** ||
| In this lesson we get familiar with the XYZ slicer to slice a model for our 3D printer. ||
| **Course Materials:** XYZmaker Suite  ([https://www.xyzprinting.com/en-US/software-series/PRINT/xyzmaker-suite](https://www.xyzprinting.com/en-US/software-series/PRINT/xyzmaker-suite)) ||
| Session 3 | Adjusting 3D printing settings |
| **Description:** ||
| In this lesson we learn how to better understand the relation between the 3D model and the printing process. We go through the basic settings provided by the software, like quality settings, temperature settings and previews. ||
| **Course Materials:** Description, Images ||
| Session 4 | 3D Printing & Math: Alphabet |
| **Description:** ||
| In this lesson we learn how to create Alphabet letters in SketchUp Software. We also learn how to find similar 3D models on Thingiverse. Additionally, we import the models into the Slicing Software and present their 3D printing preparation. ||
| **Course Materials:** Description, Images ||
| Session 5 | 3D Printing & Math: Integers |
| **Description:** ||
| In this lesson we learn how to create Integers in SketchUp Software. We also learn how to find similar 3D models on Thingiverse. Additionally, we import the models into the Slicing Software and present their 3D printing preparation. ||
| **Course Materials:** Description, Images ||
| Session 6 | 3D Printing & Math: Fractions Part1 |
| **Description:** ||
| In this lesson we learn how to create Fractions in SketchUp Software. We also learn how to find similar 3D models on Thingiverse. Additionally, we import the models into the Slicing Software and present their 3D printing preparation. ||
| **Course Materials:** Description, Images ||
| Session 7 | 3D Printing & Math: Fractions Part2 |
| **Description:** ||
| In this lesson we learn how to create Fractions in SketchUp Software. We also learn how to find similar 3D models on Thingiverse. Additionally, we import the models into the Slicing Software and present their 3D printing preparation. ||
| **Course Materials:** Description, Images ||
| Session 8 | Printing Troubleshooting |

| |
|---|
| **Description:** |
| n this lesson we learn about 3D printing problems we may face and how to fix them. These problems include Bed Adhesion, Warping and Stringing. |
| **Course Materials:** Description, Images, Video |