Universitat de Lleida

DEGREE CURRICULUM

MATHS FOR ART

Coordination: GRAU MONTAÑA, MARIA TERESA

Academic year 2022-23

MATHS FOR ART 2022-23

Subject's general information

<table>
<tr><td>Subject name</td><td>MATHS FOR ART</td></tr>
<tr><td>Code</td><td>102172</td></tr>
<tr><td>Semester</td><td>1st Q(SEMESTER) CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Bachelor's Degree in Digital Design and Creative Tehcnologies</td><td>1</td><td>COMMON/CORE</td><td>Attendance-based</td></tr>
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</td></tr>
<tr><td>Course number of credits (ECTS)</td><td>6</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><td>PRAULA</td><td>TEORIA</td></tr>
<tr><th>Number of credits</th><td>3</td><td>3</td></tr>
<tr><th>Number of groups</th><td>2</td><td>1</td></tr>
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</td></tr>
<tr><td>Coordination</td><td>GRAU MONTAÑA, MARIA TERESA</td></tr>
<tr><td>Department</td><td>MATHEMATICS</td></tr>
<tr><td>Teaching load distribution between lectures and independent student work</td><td>40% lectures, 60% independent student work
See "Development plan" of the subject.</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>catalan, and several resources in spanish or english.</td></tr>
</table>

MATHS FOR ART 2022-23

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
GRAU MONTAÑA, MARIA TERESA	maite.grau@udl.cat	9	

Subject's extra information

Suggestions

Subject that requires continuous work throughout the semester in order to achieve its goals. It requires critical thinking and capacity for abstraction.

It is recommended to frequently visit the site at the Virtual Campus since all the information is announced there.

The course as part of the academic plan

This course is in the 1st semester of 1st year of teaching. It belongs to the module of "Basic Training", specifically in the field "Scientific Basis".

Learning objectives

To know different types of successions and the notion of tending to infinity.

To know the Fibonacci succession, the gold number and its appearance in art and design.

To use different polyhedrons and polyhedra for the design.

To apply the different geometries to practical examples.

To know how to relate the algebraic expression and the graphic representation of a function.

To know different types of curves and surfaces.

To understand the notion of fractal and to know the classic fractals.

Competences

Transversal competences:

CB2. That students know how to apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.

CG7 Capacity for analysis and development of digital technologies for the visualization of information.

CT5. Acquire essential notions of scientific thinking.

Specific competences:

CE16. Understand and master the basic concepts of mathematics applied to art and digital design.

Subject contents

The contents of the subject are divided into a more theoretical part and a more manipulative part of content.

THEORETICAL PART

ISSUE 1. Planar geometry
- Cartesian axes
- Cartesian coordinates of a point
- Vectors
- Angles
- Polar coordinates
- Geometric transformations: homothecies, rotations, symmetries
- Translations in the affine plan

ISSUE 2. The infinity
- Natural numbers and real numbers
- Different types of infinities
- The sequences of numbers
- The notion of limit

ISSUE 3. The golden proportion
- Fibonacci numbers
- The golden number
- Proportionality: golden rectangles
- The golden angle
- Examples in nature, art and architecture

ISSUE 4. Progressions of numbers
- Number progressions: arithmetic and geometric
- Archimedean and logarithmic spirals
- The paradoxes of Zenon and infinity

ISSUE 5. Chaos and fractals
- Iterated successions
- Mathematical chaos
- Fractals

ISSUE 6. The number pi
- Definition of the number pi
- Different constructions of the number pi
- Examples in design and art

PRACTICAL PART

- Curves of constant width
- Representation of flat curves
- Strip pattern
- Polyhedra
- Tiles
- Non-Euclidean geometry
- Mathematical labyrinths

Methodology

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Lectures are developed by active participations of the students and with a theoretical explanation and laboratory classes in a coworking classroom where students work on concepts in a practical way. There will also be a conference by professionals on mathematical application design issues and or visits to expositions.

Exam: two written tests are done during the semester. There is also a final re-sit test.

Delivery of projects: students deliver several projects to be evaluated by the teacher.

Development plan

Week	Methodology	Contents	Hours at classroom	Hours of autonomous work
Weeks 1 - 4	Lectures	Chapter 1	8	12
Weeks 1 - 4	Laboratory	Chapter 1	8	12
Weeks 5 - 6	Lectures	Chapter 2	4	6
Weeks 5 - 6	Laboratory	Chapter 2	4	6
Weeks 7 - 8	Lectures	Chapter 3	4	6
Weeks 7 - 8	Laboratory	Chapter 3	4	9
Week 9	1ª test of evaluation (exam)	Contents until the moment	1.5	
Weeks 10 - 12	Lectures	Chapter 4	6	9
Weeks 10 - 12	Laboratory	Chapter 4	6	9
Weeks 13 - 15	Lectures	Chapter 5	6	9
Weeks 13 - 15	Laboratory	Chapter 5	6	9
Weeks 16 - 17	2ª test of evaluation (exam)	Contents since the first test and until the moment	1.5	
Week 20	Retrieval test	All the contents of the subject	2	

Evaluation

Two partial exams are scheduled: one in November and one in January, following the academic calendar of the school. There are also some written follow-up tests during the semester. The part of written tests counts 70% of the final mark, being each test of a weight of 35%.

A final project for the application of the knowledge obtained is requested and there will also be several projects to be submitted on a regular basis. The project part accounts for 30% of the final grade. To count the mark of these projects, it is required to obtain a minimum mark of 3 (over 10) on each of the partial exams.

At the end of January, a re-sit exam is scheduled to re-evaluate the two partial exams and has a 70% weight in the final mark. This exam is always to improve mark. The contents os the re-sit exam are **all the topics** of the subject.

Bibliography

Books:

Claudi Alsina, Geometría cotidiana, placeres y sorpresas del diseño, Rubes, Barcelona, 2005.

Apostolos Doxiadis, El tío Petros y la conjetura de Goldbach, Zeta Bolsillo, 2005.

Salomon Garfunkel, For all practical purposes, Mathematical literacy in today's world, COMAP 2000.

Joan Girbau, L'home de la campana: Biografia novel·lada de Carl F. Gauss, Gregal, 2015.

Marcus de Sautoy, La música de los números primos, Acantilado, 2007.

Webs:

Revista virtual de divulgació matemàtica Materials Matemàtics: http://mat.uab.es/matmat/

Centro Virtual de Divulgación de la Matemáticas: http://www.divulgamat.net/

Revista virtual de divulgación matemática Matematicalia: http://www.matematicalia.net/

Sangakoo, una web que t'ajuda a aprendre matemàtiques: http://www.sangakoo.com/cat

CREAMAT, centre de recursos per a l'ensenyament de les matemàtiques: http://srvcnpbs.xtec.cat/creamat/joomla/

Cocociència, blog de divulgació científica en català amb un apartat de matemàtiques
http://cocociencia.blogspot.com.es/

Exposición virtual Matemàticas Experimentales: http://www.experiencingmaths.org/

Portal web de matemáticas básicas: http://www.matesymas.es/

Portal divulgativo del Instituto Nacional de Estadística: http://www.ine.es/explica/explica.htm

Information is beautiful https://informationisbeautiful.net/

Reportatge sobre Matemàtiques i Art (en castellà): ¿Existe el infinito?, por Victoria Toro,
https://www.elobservadordelabelleza.com/reportaje/existe-el-infinito/

MacTutor History of Mathematics (en anglès): http://www-history.mcs.st-andrews.ac.uk/

The Story of Mathematics (en anglès): http://www.storyofmathematics.com/