



Universitat de Lleida

# DEGREE CURRICULUM

# **GRAPHIC EXPRESSION 3**

Coordination: RODRIGUEZ PADILLA, XAVIER F.

Academic year 2017-18

Subject's general information

<b>Subject name</b>	GRAPHIC EXPRESSION 3			
<b>Code</b>	101410			
<b>Semester</b>	1st Q(SEMESTER) CONTINUED EVALUATION			
<b>Typology</b>	<b>Degree</b>	<b>Course</b>	<b>Typology</b>	<b>Modality</b>
	Bachelor's Degree in Architectural Technology	2	COMPULSORY	Attendance-based
	Bachelor's Degree in Building Engineering	2	COMPULSORY	Attendance-based
<b>ECTS credits</b>	6			
<b>Groups</b>	1GG			
<b>Theoretical credits</b>	2			
<b>Practical credits</b>	4			
<b>Coordination</b>	RODRIGUEZ PADILLA, XAVIER F.			
<b>Department</b>	INFORMATICA I ENGINYERIA INDUSTRIAL			
<b>Teaching load distribution between lectures and independent student work</b>	40% Face to face time 60% Individual work hours			
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.			
<b>Language</b>	Catalan and Spanish			
<b>Office and hour of attention</b>	Arrange an appointment by email			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
BURGUÉS SOLANES, JOSEP MARIA	jburgues@diei.udl.cat	2	
RODRIGUEZ PADILLA, XAVIER F.	xrodriguezp@diei.udl.cat	4	

## Subject's extra information

Most practical course in which the study is based on the completion of at least all the exercises and practical requested, as well as consulting and performing other exercises in the bibliography.

It is considered highly recommendable cusat have adopted and achieved favorable subjects of Graphic Expression Graphic Expression 1 and 2.

Subject that race in the 1st semester of the 2nd year of teaching. It belongs to the module "Specific Training", specifically in the matter "Graphic Expression."

## Learning objectives

### Objectives:

1. Understand, interpret, develop and apply the different systems and construction elements existing in current techniques of building construction
2. Understand, interpret, develop and apply the different systems and construction elements existing historical construction techniques heritage
3. Understand, interpret, develop and learn properly resolved at the various graphic elements and constructive systems developed previously (1,2), in order to master effects and possible pathologies most common and usual building and the fundamental relationship between design and graphic expression sections and constructive details and the result of its success in building
4. Knowing how to interpret the various expression systems suitable graphics on various building systems developed theoretically (1,2,3)
5. Understand, interpret, develop and apply different concepts of scale applied to the graphic expression of the different systems and construction elements.
6. Draw sketches manuals sections and construction details of each building systems developed theoretically, to develop the student's ability to express themselves manually against various situations. Provided that they are understandable and that are properly zoned and appropriate symbolism.
7. Knowing how to graphically specify construction details and sections constructive solutions of different elements in the existing building systems developed (1,2,3) and determine the features and content of various construction details on the most common elements of a building.
8. Get regular representation systems different constructive elements, in order to apply them properly.
9. Develop construction details with existing CAD systems, learn to work in such systems simultaneously develop constructive solutions usual, even arranging it appropriately with the traditional systems of graphic expression.
10. Develop a general practice involves the generation of a "ATLAS" constructive solutions, to develop and effects of the ability to interpret edificación of existing building systems, and to transmit graphic expression normally.
11. Develop specific practices for each of the theoretical aspects developed in order to find constructive systems graphically express the content.
12. Allowing the students, from the above objectives, criteria based purchases to be able to solve the challenges

professionals to develop sustainable construction approaches, know what materials are discretized on sustainable construction, making the flow of materials and analyzes life-cycle assessment.

## Competences

### University of Lleida strategic competences

- Master Information and Communication Technologies.

### Degree-specific competences

- Ability to interpret and elaborate the graphical documentation of a project, perform data collection, plan preparation and geometrical control of work units.
- Knowledge of the computer graphics and cartographic methods in the field of building.
  - Without Translate - 1. Conèixer, saber interpretar, desenvolupar i aplicar els diferents sistemes i elements constructius existents en les tècniques actuals de construcció de l'edificació 2. Conèixer, saber interpretar, desenvolupar i aplicar els diferents sistemes i elements constructius existents en les tècniques històriques de construcció patrimonial 3. Conèixer, saber interpretar, desenvolupar i saber resoldre adequadament a nivell gràfic els diferents sistemes i elements constructius desenvolupats anteriorment (1,2), a fi i efectes de dominar les possibles patologies més comunes i habituals en edificació, i la relació fonamental entre el disseny i l'expressió gràfica dels detalls i seccions constructives i el seu èxit en el resultat de l'edificació 4. Conèixer i saber interpretar els diferents sistemes d'expressió gràfica adequats sobre els diferents sistemes constructius desenvolupats teòricament (1,2,3) 5. Conèixer, saber interpretar, desenvolupar i aplicar els diferents conceptes d'escala aplicats a l'expressió gràfica dels diferents sistemes i elements constructius. 6. Elaborar croquis manuals de seccions i detalls constructius de cadascun dels sistemes constructius desenvolupats teòricament, per desenvolupar la capacitat de l'alumne per expressar-se manualment enfront de diverses situacions professionals. Que siguin entenedors i proporcionats, que estiguin correctament acotats i amb la simbologia adequada. 7. Conèixer i saber concretar gràficament en detalls constructius i seccions les solucions constructives dels diferents elements existents en les sistemes constructius desenvolupats en (1,2,3), així com determinar les característiques i el contingut dels diferents detalls constructius sobre els elements més habituals d'una edificació. 8. Conèixer els sistemes de representació habituals dels diferents elements constructius, per tal d'aplicar-los adequadament. 9. Desenvolupar els detalls constructius amb els sistemes de CAD actuals, aprendre a treballar en aquest tipus de sistemes alhora de desenvolupar les solucions constructives més habituals, tot compaginant-ho adequadament amb els sistemes tradicionals d'expressió gràfica. 10. Desenvolupar una pràctica general consistent en la generació d'un "ATLAS" de solucions constructives, a fi i efectes de desenvolupar la capacitat d'interpretar els sistemes constructius d'edificacions existents, i transmetre'ls a l'expressió gràfica amb normalitat. 11. Desenvolupar pràctiques concretes sobre cadascun dels aspectes teòrics desenvolupats, per tal de saber expressar gràficament els sistemes constructius del contingut

### Degree-transversal competences

- Ability to plan and organise the personal work.
- Ability to work in situations where information is lacking or you are under pressure.

## Subject contents

### Contents: Theoretical part

1. Introduction: Graphic Expression of the elements and building systems through the details and building sections
  - 1.1. Concept and purpose of the construction detail.
  - 1.2. Concept of scale in construction and the construction detail section.
  - 1.3. Representation systems: manual, technological, etc ..

- 1.4. Application of the systems of representation to different building systems from the world of construction.
- 1.5. The intrinsic link between the graphic expression of the construction detail and commissioning work.

## 2. Expression Graphic, Construction and Building

- 2.1. The construction of the building hardware: Introduction to construction techniques i their relationship with the graphic expression.
- 2.2. Construction techniques and materials shaped.
- 2.3. The movimentos construction and external agents: l'living building.
- 2.4. Theoretical approach to the classification of construction elements: the wraps of built space.
  - 2.4.1. The support wrap.
  - 2.4.2. The sealed envelope.
  - 2.4.3. Thermal protection sheath.
- 2.5. Theoretical approach to the classification of construction elements: the construction elements.
  - 2.5.1. The walls.
  - 2.5.2. The ceilings.
  - 2.5.3. Porches.
  - 2.5.4. The cover.
  - 2.5.5. The facade.
  - 2.5.6. The partition

## 3. The graphic expression of the building construction systems: the construction details and building sections

- 3.1. The buildings and graphic expression of the constructive systems: strategic vision
- 3.2. Construction elements and contact with outsiders: the terrain, the climate and gravitational accions.
- 3.3. Characterization of constructive solutions and its representation.
- 3.4. Foundation systems and graphic expression.
  - 3.4.1. Soils.
  - 3.4.2. Excavations for foundations.
  - 3.4.3. Classes foundations.
- 3.5. Protection systems of buildings and their graphic expression.
  - 3.5.1. Protection against humidity.
  - 3.5.2. Impermeabilización materials.
  - 3.5.3. Thermal protection.
  - 3.5.4. Regulating the environment climate.
  - 3.5.5. Solar protection.
  - 3.5.6. Fire protection.
  - 3.5.7. It protecció against the Rays.
  - 3.5.8. Protection, insulation and sound absorption. Noise, impact and vibration.
- 3.6. Wall systems of buildings and their graphic expression.
  - 3.6.1. Masonry walls, appliances and execución.
  - 3.6.2. Masonry natural stone.
  - 3.6.3. Masonry of ceramic bricks.
  - 3.6.4. Brick masonry agglomerates.
  - 3.6.5. Reinforced masonry work.
  - 3.6.6. Concrete walls.
  - 3.6.7. Walls against the ground (underground).
  - 3.6.8. Exterior walls.
  - 3.6.9. Light partitions.
- 3.7. Systems of openings and holes in the buildings and their graphic expression.
  - 3.7.1. Openings for windows.
  - 3.7.2. Openings in doors.
  - 3.7.3. Construction starts saving elements.
- 3.8. Systems of building structures and graphic expression.
  - 3.8.1. Structures of bearing walls.
  - 3.8.2. Masonry structures.
  - 3.8.3. Reinforced concrete structures.
  - 3.8.4. Steel structures.
  - 3.8.5. Wooden structures.
- 3.9. Forged systems of buildings and their graphic expression.
  - 3.9.1. Construction requirements of the slabs.

- 3.9.2. Forged in building typology based on concrete, steel and ceramic elements.
- 3.9.3. Wooden floors.
- 3.10. Ladder systems of buildings and their graphic expression.
  - 3.10.1. Concrete stairs.
  - 3.10.2. Steel stairs.
  - 3.10.3. Wooden stairs.
  - 3.10.4. Stair railings.
- 3.11. Roofing systems buildings i your graphic expression.
  - 3.11.1. Pitched roofs.
  - 3.11.2. Flat roofs.
  - 3.11.3. Special elements of cover.
  - 3.11.4. Cover-contact building facades.
- 4. The graphic expression of the building construction systems: heritage, traditional construction and historical solutions
  - 4.1. Building typologies of historical and traditional construction.
  - 4.2. Construction techniques and materials in the form of historical and traditional construction.
  - 4.3. Evolution of traditional construction systems: construction related to the advancement of technology.
  - 4.4. Historical representation systems in traditional construction.
  - 4.5. Construction systems of traditional historical building: roofs and structural systems, foundations, facades.
- 5. The graphic expression of the building construction systems: pathology and relationship building with external agents.
  - 5.1. The building and its related packaging Immediate environment: climate, terrain and weather.
  - 5.2. Origin and classification of the main pathologies in buildings.
  - 5.3. Graphic expression of pathological states and diagnosi work. "Preventive" design constructive solutions regarding pathologies.
  - 5.4. Common examples of preventive design.

Contents: Hands-on

## 1. PR0 - COURSE PRACTICE CONSTRUCTION SOLUTIONS ATLAS

(INDIVIDUAL) Photo ID minimum of Elements and Construction Solutions for Chapter 3 Visual Dictionary GENCAT building: building construction elements: Structures and engineering structures; Foundations, roofs and facades; Internal divisions. (Nothing facilities, which affects only Civil Works - Building)

\* THIS PART OF THE PRACTICE OF COURSE HAS TO BE DELIVERED IN THE FIRST ROUND OF EVALUATION PRACTICE COURSE

(INDIVIDUAL) Work practice in Autodesk REVIT Program for the development of architectural drawings and technical architectural planimetry.

## 2. PR0.1 - COURSE PRACTICE : BIM GRAPHIC REPRESENTATION

\* THIS PART OF THE PRACTICE OF COURSE HAS TO BE BE DELIVERED IN THE LAST CLASS OF DECEMBER

- 2. PR 1: CONSTRUCTION SOLUTIONS MONOLITHIC BUILDING WALLS AND WORK BEARING FACTORY (I)
- 3. PR 2: STRUCTURAL SOLUTIONS MONOLITHIC BUILDING BEARING STRUCTURE AND CLOSURES (I)
- 4. PR 3: CONSTRUCTIVE SOLUTIONS FACADES I (I / G)
- 5. PR 4: CONSTRUCTION SOLUTIONS FACADES II (I / G)
- 6. PR 5: STRUCTURAL SOLUTIONS COVERS II (I / G)
- 7. PR 6: STRUCTURAL SOLUTIONS COVERS II (I / G)

## Methodology

Classes are divided into two intrinsically related parts: the first weekly classes will have a theoretical component, which will be set out the agenda, and ?? the past week classes will have an essentially practical component, in which They will conduct exercises related to the corresponding theory.

To carry out the practices of hand drawing and sketches, the format will work mainly in A3 and A4. The rest of the work will take place at around CAD.

Since the time available is limited, the student will have some course notes and bibliography to develop in those who find all those theoretical concepts presented in class.

The programming can be expected to move forward the three theoretical issues, while the practical content of the subject. So, there will be a weekly 2-hour theory session, countered and complemented by another weekly practice session, also 2 hours.

At the beginning of the course, a practice course will arise to develop during the course of the course, consisting of developing a "ATLAS" recognition of constructive elements that allows the student able to identify, understand and interpret the different constructive solutions edificacions types.

The other practical developments of the subject will be presented at the classroom on schedule in planning, solving them in the following practice time (practice), and collecting the beginning of the next practice the digital practices job.

## Development plan

Dates (weeks)	Description:	Classroom Activity	Contact hours (2)	Autonomous work activity	Non Contact hours (3)
1	Course presentation Theory – Chapter 1 Theory – BIM	Theoretical class	2	Study and works	3
1	Course work presentation	Classroom work	2	Non-contact practices	3
2	Theory – BIM	Theoretical class	2	Study and works	3
2	Course work – BIM	Classroom work	2	Non-contact practices.	5
3	Theory – BIM	Theoretical class	2	Study and works	3
3	Course work – BIM	Classroom work	2	Non-contact practices.	5
4	Theory – Chapter 1	Theoretical class	2	Study and works	3
4	Course work – PR1	Classroom work	2	Non-contact practices.	5
5	Theory – Chapter 2	Theoretical class	2	Study and works	3
5	Course work – PR1	Classroom work	2	Non-contact practices.	5
6	Theory – Chapter 3	Theoretical class	2	Study and works	3
6	Course work – PR1	Classroom work	2	Non-contact practices.	5

7	Theory – Chapter 3	Theoretical class	2	Study and works	3
7	Course work – PR2	Classroom work	2	Non-contact practices.	5
8	Theory – Chapter 3	Theoretical class	2	Study and works	3
8	Course work – PR3	Classroom work	2	Non-contact practices.	5
9	<b>Theoretical Evaluation Test 1</b>	<b>Theoretical Evaluation Test 1</b>	1	-	-
9	<b>Practice Evaluation Test 1</b>	<b>Practice Evaluation Test 1</b>	2	-	-
10	Theory – Chapter 3	Theoretical class	2	Study and works	3
10	Course work – PR3	Classroom work	2	Non-contact practices	5
11	Theory – Chapter 3	Theoretical class	2	Study and works	3
11	Course work – PR4	Classroom work	2	Non-contact practices	5
12	Theory – Chapter 3	Theoretical class	2	Study and works	3
12	Course work – PR4	Classroom work	2	Non-contact practices.	5
13	Theory – Chapter 3	Theoretical class	2	Study and works	3
13	Course work – PR5	Classroom work	2	Non-contact practices	5
14	Theory – Chapter 3	Clase Teoría	2	Study and works	3
14	Course work – PR5	Theoretical class	2	Non-contact practices	5
15	Theory – Chapter 3	Clase Teoría	2	Study and works	3
15	Course work – PR5	Theoretical class	2	Non-contact practices	5
16	<b>Theoretical Evaluation Test 2</b>	<b>Theoretical Evaluation Test 2</b>	1	-	-
16	<b>Practice Evaluation Test 2</b>	<b>Practice Evaluation Test 2</b>	2	-	-
17	-	-	-	-	-
17	-	-	-	-	-
18	Tutorías	Tutorship	-	-	-
19	Recuperación. Examen Teòrico	<b>Theoretical Evaluation Test. Recovery exam</b> 1 hour	-	-	-
19	Recuperación. Examen Pràctico	<b>Practice Evaluation Test. Recovery exam</b> 2 hours	-	-	-



Study and works

## Evaluation

Objectives	Assesment Activities	%	Dates	M/V (1)	I/G (2)
	Evaluation Test TEO. 1	12,5	Week 9	M	I
	Evaluation Test TEO. 2	12,5	Week 17	M	I
	Evaluation Test PRACT. 1	12,5	Week 9	M	I
	Evaluation Test PRACT. 2	12,5	Week 17	M	I
	PR0+PR0.1	18+7	Weeks 1-14	M	I
	PR1	5	Weeks 2-4	M	I
	PR2	5	Weeks 5-6	M	I
	PR3	5	Weeks 7-8	M	I
	PR4	5	Weeks 10-11	M	I
	PR5	5	Weeks 12-14	M	I

( 1) Mandatory / Voluntary

( 2) Individual / Group

The aim of the subject weighs the same as the theoretical content practical, putting much emphasis on practical student work and understanding of the concepts presented .

Attendance and presentation of all practices in time resulted in the planning of the course will also be a determining motive in the assessment of the tasks performed by the students. The student is required to submit all of the work , and at the end of the course , failure to exclude one of the practices the students pass the subject .

BE LIABLE exceed the following content with more than a quarter so they can make half with the rest :

1- . Theoretical partial ( The average of the two partial )

2- . Practical partial ( The average of the two partial )

3- . Practice ( The average of all curricular practices )

4-. Atlas Course and BIM practice

## Bibliography

### **1.-Basic Bibliography-**

- Paricio Ansuategui, Ignacio. Els elements. A: ParicioAnsuategui, Ignacio. 'La construcció de l'arquitectura'. 3ª ed. rev. Barcelona:Institut de Tecnologia de la Construcció de Catalunya, 1995-1996, vol. 2.

- Paricio Ansuategui, Ignacio. Les tècniques. A: Paricio Ansuategui, Ignacio.'La construcció de l'arquitectura'. 3ª ed. rev. Barcelona: Institut deTecnologia de la Construcció de Catalunya, 1995-1996, vol. 1.

- Schmitt, Heinrich; Heene, Andreas. 'Tratado deConstrucción'. Gustavo Gili, 1998. ISBN 8425217296.

- Beinhauer, Peter. 'Atlas de detalles constructivos: con más de 400 ejemplos '. Barcelona: Gustavo Gili, 2006. ISBN 9788425220579.

-Ching, Frank; Adams, Cassandra. 'Guía de construcción ilustrada'. 3ª. ed.México: Limusa Wiley, 2004. ISBN 9681862929.

- Araujo, Ramón. Superficies. A. Araujo, Ramón. 'Laarquitectura como técnica'. Madrid: A.T.C. Ediciones, 2007-, vol. 1.

- Dibujo a mano alzada para arquitectos / Magali DelgadoYanes i Ernest Redondo Domínguez / Ed. Parramón.

- AutoCAD básico / Sham Tickoo/ Ed. Paraninfo, 2000.

- AutoCAD avanzado/ Sham Tickoo/ Ed. Paraninfo, 2000.

- Modelado 3D con AutoCAD / John E. Wilson / Ed. Anaya, 2002

### **2.-Terminology and understanding-**

- 'Diccionari visual de la construcció'[Recurs electrònic ].3a ed. Barcelona: Generalitat de Catalunya. Departament de Política Territorial i Obres Públiques, 2001. ISBN 84-393-5046-5.

Disponible a:

<http://www10.gencat.net/ptop/AppJava/cat/documentacio/llengua/terminologia/diccvisual.jsp>

- 'Diccionari visual de la construcció'. 6a ed. Barcelona: Generalitat de Catalunya, Departament de Política Territorial i Obres Públiques, 2004. ISBN8439365098.

- Fullana Llopart, Miquel. 'Diccionari de l'art dels oficis i de la construcció'. 6a ed. augmentada. Palma de Mallorca: Moll, 1995. ISBN84-273-0743-8.

- Paniagua Soto, José Ramón. 'Vocabulario basico de arquitectura'. Madrid:Cátedra, 1978.

- Arte de proyectar en arquitectura / Ernst Neufert / Ed.GG.

### **3-. Regulations and applicable law Websites-**

- CTE (Código Técnico de la Edificación).

<http://www.codigotecnico.org>

- CTE: Catàleg de solucions constructives aplicables.

[http://www.codigotecnico.org/fileadmin/Ficheros\\_CTE/Documentos/CTEFeb08/CAT-EC-v05.0\\_MAYO08.pdf](http://www.codigotecnico.org/fileadmin/Ficheros_CTE/Documentos/CTEFeb08/CAT-EC-v05.0_MAYO08.pdf)

- Normas Tecnológicas de la Edificación NTE /Ed. Ministerio de Obras Públicas, Transportes y Medio Ambiente.

### **4-.Specialized publications-**

- Magazine TECTÓNICA.

<http://www.tectonica.es>

- Magazine DETAIL.

<http://www.detail.de>

### **5-.Related institutions -.**

- Institut de Tecnologia de la Construcció de Catalunya

<http://www.itec.cat>

- Instituto de Ciencias de la Construcción Eduardo Torroja.

<http://www.ietcc.csic.es>

- Arxiu Docent de la UPC (Universitat Politècnica de Catalunya).

<http://www.upcommons.upc.edu/>

- Arxiu Digital de la UPM (Universitat Politècnica de Madrid).

<http://oa.upm.es/pfc.html>

## 6- Interesting Websites-

<http://www.asuni.es/>

Website featuring all of the family of Autodesk products

<http://www.cype.es/>

Web Cype includes all materials relating to construction details , foundation details , budget calculations , bibliography of interest, etc.

<http://www.buscadorarquitectura.com/>

General Browser of architectural aspects.

<http://www.nemetscheck.es/>

Allplan's software Website.

<http://www.constructalia.com/>

General Browser of architectural and construction aspects.

<http://www.soloarquitectura.es/>

General Browser of architectural aspects.