
University-Enterprises Cooperation In Game Industry In **Ukraine**

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# Deliverable 1.1

# Report on analysis of existing programs and curricula at programme countries´ universities

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# GameHub Consortium

| Beneficiary Number | Beneficiary name | Beneficiary short name | Country |
|---|---|---|---|
| P1 | University of Deusto | UDEUSTO | Spain |
| P2 | Akademia Gorniczo-Hutnicza im. Stanislawa Staszica w Krakowie | AGH / AGH-UST | Poland |
| P3 | FH JOANNEUM Gesellschaft M.B.H. | FH J | Austria |
| P4 | Quality Austria Trainings, Zertifizierungs und Begutachtungs GmbH | Quality Austria | Austria |
| P5 | Fundacion VIRTUALWARE Labs | VWLABS | Spain |
| P6 | Fundacion Deusto | FD | Spain |
| P7 | Donetsk National Technical University | DonNTU | Ukraine |
| P8 | Vasyl Stefanyk Precarpathian National University | PNU | Ukraine |
| P9 | Kherson National Technical University | KNTU | Ukraine |
| P10 | Kyiv National University of Construction and Architecture | KNUCA | Ukraine |
| P11 | National Technical University “Kharkiv Polytechnic Institute” | NTU KHPI | Ukraine |
| P12 | Odessa National Polytechnical University | ONPU | Ukraine |
| P13 | Ukrainian Association of IT professionals | UAITP | Ukraine |

# Executive Summary

This report analyses and summarizes the available courses in design, programming, art and transversal skills that are thought of enhancing the engineering education to fit challenges and demands of contemporary economy in the Game Industry sector. The three partner universities of the program countries, University of Deusto (UDEUSTO) in Spain, AGH University of Science and technology (AGH-UST) in Poland and the FH Joanneum GmbH (FHJ) in Austria, provided filled in templates with the analysis of courses at their universities that were thought to contribute to the competence profiles of employees in the game industry sector. The course descriptions were gathered and compared to one another according to the student's competences they are addressing. The outcome of this paper is a series of competence lists in the areas of design, programming, art and transversal skills.

# 1 Introduction

The GameHub project is committed to stimulate higher education in the development of student's knowledge and skills for the creation of a stable, vibrant and creative Ukrainian games development sector that could be globally competitive and culturally recognized. The Computer Game Design (CGD) sector is a multidisciplinary field requiring competences that include computer science, physics, engineering, visual technology, music techniques, humanities, e.g. cognitive psychology, art study and game design.

Through a collection of course descriptions offered at University of Deusto (UDEUSTO) in Spain, AGH University of Science and technology (AGH-UST) in Poland and FH Joanneum GmbH (FHJ) in Austria, we aim to understand how European Union countries build the skills of their students for working in the game industry sector.

This report describes the method used for the collection of the curricula and goes on to compare the courses provided by the three universities according to the student's competences they are designed to build.

The results of this report will be used in combination with the report on the analysis of the ICT and Game Industry (GI) market in Ukraine (Del. 1.2.) in order to develop the questionnaires for the competence profiles needed in the GI sector (Del. 1.3.). In a further step we will develop the didactical approaches suggested for supporting students, unemployed and ATO veterans' knowledge and competency building in these areas (Del.1.4). Based on the activities 1.1 to 1.4 we will draft the pedagogical and technical requirements of the GameHubs in Ukraine.

Moreover, some partners, like UDEUSTO, provided information on projects in the area of digital games that they have been carrying out.

# 2 Methods

During the kick off meeting of the GameHub project in Bilbao in November 2015 it was decided to design templates for gathering information on existing programs and curricula at the partner universities, as well as information on the projects in the area of digital games that are running in each university.

## 2.1 Templates for Course Analysis

For gathering structured and useful information on courses that enhance engineering education, offering their students useful skills and competences for them to work in the sector of the game industry, we used a two-step approach to design a template.
The first suggestion was made by the FH Joanneum, responsible partner for the "Deliverable 1.1. Report and Analysis of Existing Programs and Curricula at Program Countries' Universities". Following structure was suggested, that is in accordance to the FH Joanneum structure for describing courses offered at the university. The structure included: title, institution, department, lecturer, language, type, ECTS, level, description and learning objectives. The template was distributed to all of the partners for feedback and was discussed via eMail exchange. The template for courses was distributed to the partners together with a filled in example of a course description that was provided to support understanding of the terminology used.
Partners contributed suggestions and examples and the template was enhanced by following elements: prerequisites, relation to the game industry, list/enumeration of themes/topics that should be mastered during the course, competences/learning objectives, outcomes, assignments, evaluation/grading/form of control, references, hardware and software required and webpage. Partners also suggested the addition of examples, to facilitate shared understanding of some entries, as well as a limitation of the maximal amount of characters in some of the entries, that were thought of needing large amount of text to be described. The limitation of the number of characters was thought to motivate researchers to have a better look at the information that needed to be provided.
This is the template for the description of courses that was decided upon in communication within the consortium via eMail exchange.

| | |
|---|---|
| **Name of provider / GameHub partner institution / country:** | |
| **Title** | |
| **Institution / Department** | |
| **Lecturer** | |
| **Language** | |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | |
| **ECTS** | |
| **Level** | |
| **Prerequisite(s)** | |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | |
| **References** (max. 3 that are key for the programme/project) | |
| **Hardware and software required** | |
| **Webpage** | |

*Table 2.1.1 Course template*

## 2.2 Templates for project descriptions

The provision of information on existing projects in the area of digital games at each partner university was suggested as a means for exchanging information about current trends and topics of research and development.
Just like the template for courses, FH Joanneum made a first suggestion according to the structure of project description at their university. The structure for projects included following fields: title, financial support/funding, target group, initial situation, objectives, description of activities, coordinating institution, partners institutions and webpage. The template for projects was distributed to the partners together with a filled in example of a project description that was provided to support understanding of the terminology used.
After communication within the project consortium it was agreed that the field expected results should be added in the template. This is the template for the description of projects that was decided upon in communication within the consortium via eMail exchange.

| | |
|---|---|
| **Name of provider / GameHub partner institution / country:** | |
| **Title** | |
| **Finacial support / Funding** | |
| **Target group** | |
| **Initial situation** | |
| **Objectives + Relation to Game Industry** | |
| **Description of activities** | |
| **Expected results** | |
| **Coordinating institution** | |
| **Partner institutions** | |
| **Webpage** | |

*Table 2.2.1 Project template*

# 3 Results and analysis

The process of gathering descriptions of courses and projects was planned to last during February 2016, it did however last until the mid of July due to the difficulty of coming to the required information. The difficulty in accessing information on the courses lay on the way universities use to document courses and curricula on their websites for their students and the interested public. Courses offered in English have been much more thoroughly described in the English language than courses offered in the national language of the participating institutions. Descriptions of courses offered in the national languages had to be translated by the partner institutions and for some of them only a short summary was provided. Course teachers were contacted for information on their courses, but many of them either avoided communication or denied to provide the information due to the extra workload this would mean for them personally.
This chapter reports on the overall numbers of the descriptions of courses and projects gathered by the partnership and presents an analysis of the gathered data.

## 3.1 Overall Numbers of Courses

70 course descriptions, collected in various degrees of completeness, were gathered by the three universities of the european community (AGH-UST, UDEUSTO and FHJ). 31 of the 70 courses were completely analysed offering the direct link to the game industry and most available information required from the templates. 31 courses were partly analysed, offering some of the information required by the template, mostly the overall descritption and the learning objectives, but not detailed information on assignments or hardware and software required. The direct link to the game industry is in these cases a matter of interpretation and personal opinion of the researchers. 7 courses were thought by the researchers to be relevant but due to missing information only short summaries were provided. The table below shows the distribution of courses analysed per partner and their degree of completeness.

| **Partner** | **Number of courses analysed** | **Degree of completeness** |
|---|---|---|
| AGH-UST | 11 | Completely analysed |
| AGH-UST | 7 | Short summaries |
| DEUSTO | 20 | Completely analysed |
| FHJ | 31 | Partly analysed from website information |
| FHJ | 1 | Completely analysed |
| **SUM** | **70** | |

*Table 3.1.1 Distribution of courses analysed per partner and the degree of report completeness*

All courses analysed can be found in Annex 1 to 47.

## 3.2 Course Clusters

The course descriptions were collected by FHJ and have been categorised in 4 clusters. These are: design, programming, art and transversal skills. Following definitions where used for clustering the courses:

**Design**: describes competences needed "to prepare the preliminary sketch or the plans for [a digital game], especially to plan the form and structure of [a digital game][1]".
**Programming**: describes comptences needed to carry out computer programming "a process that leads from an original formulation of a computing problem to executable computer programs. Programming involves activities such as analysis, developing understanding, generating algorithms, verification of requirements of algorithms including their correctness and resources consumption, and implementation (commonly referred to as coding) of algorithms in a target programming language [2]".
**Art**: describes competences needed for producing images and or music for digital games that follow "aesthetic principles, of what is beautiful, appealing, or of more than ordinary significance[3]".
**Transversal skills**: describes "knowledge, skills, and attitudes that will help learners find personal fulfilment and, later in life, find work and take part in society. These key competences include 'traditional' skills such as communication in one's mother tongue, foreign languages, digital skills, literacy, and basic skills in maths and science, as well as horizontal skills such as learning to learn, social and civic responsibility, initiative and entrepreneurship, cultural awareness, and creativity [4]". In the cluster of transversal skills we included the field of project management, a set of skills adressed nowadays in almost every study degree. Project management was defined as: "The body of knowledge concerned with principles, techniques, and tools used in planning, control, monitoring, and review of projects [5]".
From the overall 70 course descriptions 19 were assigned in the design category, 20 in programming, 6 in art and 25 in transversal skills. Table 3.2.1 below shows the distribution of courses per university and cluster. As indicated AGH-UST provided course descriptions mostly dealing with transversall skills, while the difference to design (1), art (0) and programming (3) is very big. The same applies for FHJ. Design courses analysed were 16, as opposed to much lower numbers for programming (5), Art (5) and transversal skills (6). Most courses offered by the University of DEUSTO fall in the category of Programming.

| University | Design | Programming | Art | Transversal Skills |
|---|---|---|---|---|
| AGH-UST | 1 | 3 | 0 | 14 |
| DEUSTO | 2 | 12 | 1 | 5 |
| FHJ | 16 | 5 | 5 | 6 |
| **SUM** | **19** | **20** | **6** | **25** |

*Table 3.2.1. Distribution of courses per university and cluster*

This distribution shown in the table above is uneven and cannot imply a priorisation of skills needed in the game industry. What it shows is the focus laid in each university. None of the three European community universities offers a study degree that educates students for the game industry in specifically, just separate courses focusing specifically on game design, development and management.

[1]Source of definition: http://www.dictionary.com/browse/design
[2] Source of definition: https://en.wikipedia.org/wiki/Computer_programming
[3] Source of definition: http://www.dictionary.com/browse/art?s=t
[4] Source of definition: http://ec.europa.eu/education/policy/school/competences_en.htm
[5] Source of definition: http://www.businessdictionary.com/definition/project-management.html

After assigning courses to the clusters mentioned above we analysed the learning objectives and the competences addressed in the various courses in terms of the various aspects they address. To carry out the analysis we made a list of all competences in each cluster and assigned them to the various aspects they address in each cluster.
Following definition is used for the concept of competences:

> *"A competency is the capability to apply or use a set of related knowledge, skills, and abilities required to successfully perform "critical work functions" or tasks in a defined work setting. Competencies often serve as the basis for skill standards that specify the level of knowledge, skills, and abilities required for success in the workplace as well as potential measurement criteria for assessing competency attainment."*[6]

In the effort of filtering the competences out of the learning objectives of each course it became apparent that we also need to define the difference between the learning objectives and competences. That is:

> *"Competencies define the applied skills and knowledge that enable people to successfully perform their work while learning objectives are specific to a course of instruction. Competencies are relevant to an individual's job responsibilities, roles and capabilities. They are a way to verify that a learner has in fact learned what was intended in the learning objectives. Learning objectives describe what the learner should be able to achieve at the end of a learning period. Learning objectives should be specific, measurable statements and written in behavioral terms. In short, objectives say what we want the learners to know and competencies say how we can be certain they know it."*[7]

Interesting to mention is that some transversal skills are embedded in courses that are clearly assigned to the other categories. The intention is to practice specific transversal skills, like for example a foreign language (many courses are offered in English) and project management in the context of a specific subject or a specific project.

## 3.3. Analysis of Design Cluster

From the 22 courses offered in the area of Design, 16 were described by FHJ, one by AGH-UST and five by DEUSTO. Table 3.3.1 shows the list of courses categorised in this cluster.

| Nr. | Annex Nr. | University | Titel |
|---|---|---|---|
| 1 | 12.1. | AGH-UST | Interface design |
| 2 | 13. | DEUSTO | Interaction and Multimedia |
| 3 | 16. | FHJ | User Experience design 1 |
| 4 | 17. | FHJ | User Interface Design |
| 5 | 18. | FHJ | User-centred Design |
| 6 | 19. | FHJ | Usability Testing |
| 7 | 21. | FHJ | App Design 1 |

[6] Quelle: https://sph.uth.edu/content/uploads/2012/01/Competencies-and-Learning-Objectives.pdf
[7] Quelle: https://sph.uth.edu/content/uploads/2012/01/Competencies-and-Learning-Objectives.pdf

| | | | |
|---|---|---|---|
| 8 | 22. | FHJ | Interaction design |
| 9 | 23. | FHJ | Media Design Startups |
| 10 | 24. | FHJ | Interfaces |
| 11 | 26. | FHJ | Psychology of perception |
| 12 | 27. | FHJ | Sound and Interaction Design |
| 13 | 28. | FHJ | Interaction Design |
| 14 | 34. | FHJ | Creative Writing 1 |
| 15 | 35. | FHJ | Multimedia Product Develeopment 1 - User Centred |
| 16 | 36. | FHJ | Applied Game design |
| 17 | 39. | FHJ | App-Design 2 |
| 18 | 44. | FHJ | Media Production |
| 19 | 58. | DEUSTO | Interactive multimedia and videogames |

*Table 3.3.1 List of courses categorised in the category "Design".*

A first view of the table shows overlaping courses in the areas of Interaction (3) and Interface Design (3). A closer look however indicates that the concept of interaction and interface are sometimes addressed in the same course, although only one aspect is used for the title of the course. This is the case for example for course in annex 24 *Interfaces* that offers students the opportunity to learn how to "develop interaction and interface concepts".
All other courses adress more specific aspects of design that has application in the game industry. In this chapter we present and discuss the list of competences for the areas of interaction design, interface design and other design related areas.

### *3.3.1 Interaction Design*

Students understand, develop concepts and/or realise projects in following aspects of interaction design:

| Course Annex Nr. | Interaction Design Competences |
|---|---|
| 13 | The importance and history of Human Computer Interaction (HCI). |
| 13 | Interaction paradigms |
| 13 | Characteristics and properties of interaction controls |
| 16, 21 & 39 | Skills in interaction design of interactive media as well as in the field of advanced technologies (touchless interfaces, media spaces, sensory environments) |
| 17 | Information architecture; |
| 21 | Design focused application development for browsers |
| 24 | Development of interaction concepts, content oriented design, development of prototypical solutions. |

| | |
|---|---|
| 22 & 28 | Conception and realization of practical projects and working on tasks set in the area of interactive media design, game design and screen design. |
| 22 | Development, Realization and Discussion of interactive design work |
| 35 | Plan, realize and evaluate Rich Internet Applications using the principles of interaction design. |
| 36 | Draft, graphic realisation and analysis of the technical realisation of computer games<br>Diverse gaming mechanisms. |
| 39 | Design focused development for mobile devices (smartphone, tablet, iOS and Android). |
| 55 | Document software designs, correctly using suitable UML diagrams and notation. |
| 59 | Create, manage and design the distribution of multiplatform interactive multimedia software products |

### *3.3.2 Interface design*

Students understand, develop concepts and/or realise projects in following aspects of interface design:

| Course Annex Nr. | Interface Design Competences |
|---|---|
| 12.1 | Designing interfaces: principles of user interface development (learnability, visibility, error prevention, efficiency, graphic design) |
| 12.1 | Implementing interfaces: Techniques for building user interfaces (low-fidelity prototypes, wizard of Oz, and other prototyping tools) |
| 13 | Graphic design elements |
| 13 | The terminology, theoretical models and design principles of user interfaces and their application to the development of interactive computer programs. |
| 16, 21 & 39 | Skills in interface design of interactive media as well as in the field of advanced technologies (touchless interfaces, media spaces, sensory environments) |
| 17 | Basics, skills, project handling, implementation and realization of interfaces; |
| 17 | User interface patterns and standards; |
| 17 | Display and visualization of information; |
| 17 | Transition from user interface to service design |
| 17 | Digital prototypes |
| 24 | Development of interaction and interface concepts, content oriented design, development of prototypical solutions. |
| 22, 28 | Conception and realization of practical projects and working on tasks set in the area of interface design, interactive media design, game |

| | |
|---|---|
| | design and screen design. |
| 39 | Design focused development for mobile devices (smartphone, tablet, iOS and Android). |

### *3.3.3 User Experience Design*

Students understand, develop concepts and/or realise projects in following aspects of user experience design:

| Course Annex Nr. | User Experience Design Competences |
|---|---|
| 16 | Analysis methods, aspects of user experiences in the interaction with a product, a service, an environment or an institution |

### *3.3.4 Usability Design*

Students understand, develop concepts and/or realise projects in following aspects of usability design:

| Course Annex Nr. | Usability Design Competences |
|---|---|
| 12.1 | Designing interfaces: principles of user interface development (learnability, visibility, error prevention, efficiency, graphic design) |
| 12.1 | Evaluating interface usability: heuristic, predictive and user testing evaluations |
| 13 | Accessibility |
| 18 | Paper prototypes and iterative design; |
| 19 | Usability testing of websites using the Thinking-Aloud-Method |

### *3.3.5 Psychology of perception*

Students understand, develop concepts and/or realise projects in following aspects of psychology of perception:

| Course Annex Nr. | Psychology of Perception Competences |
|---|---|
| 13 | Information processing in humans |
| 26 | Basics of the psychology of perception and the physiology of the sensory system. |

| | |
|---|---|
| 27 | Perceptual and cognitive aspects of auditory scene analysis, perception of space and aspects of attention and their application into auditory display design. How audio interacts with other senses such as vision and touch within the scope of user interface design. |

### *3.3.6 Multimedia Design*

Students understand, develop concepts and/or realise projects in following aspects of multimedia design:

| Course Annex Nr. | Multimedia Design Competences |
|---|---|
| 13 | Multimedia systems and the importance of digital formats |
| 13 | Digitizing and quantizing |
| 13 | Description of digital media (text, graphic, sound, animation, video) |
| 13 | Analyze the main characteristics of different digital media |
| 13 | Develop simple multimedia programs incorporating both discrete and continuous media. |
| 23 | Technical skills in the field of multimedia authoring, conceptual and contextual supervision of the "real world" projects, supportive inputs concerning media economy and production methods. |
| 44 | Development of narrative forms, production concept, production design, camera and lighting technology, sound recording technology, media technological content such as technical formats, codecs, etc |
| 59 | Locate, analyze and propose methodologies, methods, techniques, programs specific use, norms and standards of computer graphics, video, animation and interactive multimedia. |
| 59 | Create, manage and design the distribution of multiplatform interactive multimedia software products |

### *3.3.7 User-centred Design*

Students understand, develop concepts and/or realise projects in following aspects of user-centred design:

| Course Annex Nr. | User-centred Design Competences |
|---|---|
| 18 | User-centred design process models |

| | |
|---|---|
| 18 | Methods to analyse the users' requirements such as contextual interviews, focus groups, diary studies and task analysis, creation of personas, scenarios and storyboards; |
| 35 | plan, realize and evaluate Rich Internet Applications using the principles of user centered design |

### *3.3.8 Video Design*

Students understand, develop concepts and/or realise projects in following aspects of video design:

| Course Annex Nr. | Video Design Competences |
|---|---|
| 23 | Imparting of technical skills in the field of video postproduction, especially in the field of animation, of 3D design, of 3D animation, of multimedia authoring, conceptual and contextual supervision of the "real world" projects, supportive inputs concerning media economy and production methods. |
| 23 | Use and further development of design skills and technical competences when dealing with video and animation in so-called "real world" projects |
| 44 | Development of narrative forms, production concept, production design, camera and lighting technology, sound recording technology, media technological content such as technical formats, codecs, etc |
| 44 | Technical and creative skills in the field of sound design and video production and postproduction. Using these skills in first practical projects. |

### *3.3.9 Animation Design*

Students understand, develop concepts and/or realise projects in following aspects of animation and 3D design:

| Course Annex Nr. | Animation and 3D Design Competences |
|---|---|
| 23 | Imparting of technical skills in the field of video postproduction, especially in the field of animation, of 3D design, of 3D animation, of multimedia authoring, conceptual and contextual supervision of the "real world" projects, supportive inputs concerning media economy and production methods. |

| | |
|---|---|
| 23 | Use and further development of design skills and technical competences when dealing with video and animation in so-called "real world" projects |
| 59 | Locate, analyze and propose methodologies, methods, techniques, programs specific use, norms and standards of computer graphics, video, animation and interactive multimedia. |

### *3.3.10 Sound Design*

Students understand, develop concepts and/or realise projects in following aspects of sound design:

| Course Annex Nr. | Sound Design Competences |
|---|---|
| 27 | Topics related to Human Computer Interaction with Audio.<br>The use of audio modality and the spatial dimension of audio in human computer interaction.<br>Ways to present information through audio using speech and non-speech sounds as well as sonification.<br>Perceptual and cognitive aspects of auditory scene analysis, perception of space and aspects of attention and their application into auditory display design.<br>How audio interacts with other senses such as vision and touch within the scope of user interface design.<br>Interaction techniques and ways to implement them through contemporary technologies involving user tracking and sensing. |
| 44 | Development of narrative forms, production concept, production design, sound recording technology, media technological content such as technical formats, codecs, etc |
| 44 | Technical and creative skills in the field of sound design and video production and postproduction. Using these skills in first practical projects. |

### *3.3.11 Writing*

Students understand, develop concepts and/or realise projects in following aspects of writing:

| Course Annex Nr. | Writing Competences |
|---|---|

| | |
|---|---|
| 34 | Professional writing.<br>What constitutes a (good) text.<br>Composing a text and the rules accordingly applied.<br>The analysis of sample texts and discussion on different writing styles and genres<br>Writing own texts.<br>Proof-reading and editorial work.<br>The balance between form, style and content: assess different communication situations correctly and to choose the adequate focus in form, style and content. |

## 3.4 Analysis of Programming Cluster

Twenty (20) course descriptions that address programming competences were provided by the partners, three (3) from AGH-UST, four (4) from FHJ and twelve (12) from UDEUSTO. These are listed in the table below:

| Annex Nr. | University | Programming Course Title |
|---|---|---|
| 1. | AGH-UST | Cybersecurity |
| 9. | AGH-UST | Mobile systems |
| 11. | AGH-UST | Web application technologies |
| 15. | FHJ | Informatics 1 for Students of Information Management |
| 25. | FHJ | Digital sound processing |
| 30. | FHJ | Computer Vision |
| 32. | FHJ | Basics of Software Engineering |
| 46. | FHJ | SW Engineering - Mobile and location based Computing |
| 48. | DEUSTO | Programming I |
| 49. | DEUSTO | Programming II |
| 50. | DEUSTO | Programming III |
| 51. | DEUSTO | Programming IV |
| 52. | DEUSTO | Intelligent Systems |
| 56. | DEUSTO | Advanced Software Development |
| 59. | DEUSTO | Internet protocols, technologies and services |
| 60. | DEUSTO | Mobility and ubiquitous computing |
| 61. | DEUSTO | Advanced artificial intelligence |
| 53. | DEUSTO | Software Requirements |

| | | |
|---|---|---|
| 54. | DEUSTO | Software Design |
| 55. | DEUSTO | Software Process and Quality |

*Table 3.4.1 List of courses categorised in the category "Programming".*

Like in the design cluster above the learning objectives and competences from the courses in the programming cluster where gathered and categorized according to the aspects of programming they cover.

### *3.4.1 Basic Programming*

Students understand, develop concepts and/or realise projects in following aspects of basic programming skills:

| Course Annex Nr. | Programming Competences |
|---|---|
| 15 | The following topics are discussed during the lectures:<br>• Definition of terms (computer science, algorithm, program, message, information message)<br>• analog-, digital- and binary data representation<br>• codes (ASCII, ANSI, UNICODE, etc.)<br>• number systems<br>• representation of numbers (external, BCD, binary, fixed point, floating-point)<br>• multimedia data (signal types, digitalization, audio signal, audio file formats, image- and grafic file formats), the XML family of technologies<br>• propositional logic, digital logic<br>• computer organization, digital technology<br>• computer architecture, principle and function of micro processors<br>The following topics are discussed during the practical training:<br>• simulation of digital logic circuits<br>• programming languages (interpreter, compiler, linker, programming languages overview )<br>• fundamental terms of software developement<br>(During the practical training different diagram types - flow chart, nassi-shneiderman chart, pseudo code- are used to develop algorithms).<br>• XML, XSL, XML-Schema |
| 32 | Building on the course "Informatics Advanced" which aimed at getting first contact to programming and algorithmic design this course will mainly focus on the OOP (Object Oriented Programming) paradigm. Moreover, first contact to Android mobile application development will be established. |
| 32 | Besides gaining more programming skills students will also be given an introduction to common software engineering methods and tools (software process models, requirements engineering methods, testing, etc.). |

| | |
|---|---|
| 49 | Specify, design and implement algorithms in an object-oriented programming language, using efficient, systematic and organized methods for problem solving. |
| 49 | Write correctly, compile and run programs in high-level language. |
| 49 | Using efficiently in algorithms the static data structure array |
| 50 | Design classes and algorithms using the Java language to solve varied problems about programming. Test and debug the code performed until proper behaviour is obtained. |
| 50 | Develop code using high-level tools (integrated development environment). |
| 50 | Adequately integrate to the application development some elements of certain coding complexity: interfaces, exceptions, events and threads. |
| 51 | Design classes and algorithms using the Java language to solve, test and debug the code performed until proper operation. |
| 51 | Develop code using low-level tools (text editor, compiler, command line) and high (integrated development environment with visual editor windows) environment. |
| 51 | adequately integrated some application development elements with certain encoding complexity: Java Collections, composite structures data, databases and files, patterns basic design, user interfaces developed. |
| 51 | Identify inefficiency areas in a program to find the optimal solution. |
| 52 | Apply the basics of structured programming and object-orientation of the languages C and C / C ++ in solving computer problems. |
| 52 | Analyze requirements, problem and solution design and develop a functional, flexible and robust computer team using the required characteristics of C / C ++ language. |
| 53 | To formulate search problems and to identify and apply an appropriate solving technique. |
| 53 | To define and apply good heuristics to solve different problems considered difficult. |
| 53 | To apply machine learning techniques as a way for an intelligent system to gain a certain degree of autonomy. |
| 53 | To analyze problems whose resolution requires empirical knowledge and to design knowledge based systems. |
| 57 | Problem resolution. CG9.2. Use your experience and judgment to analyze causes of a problem and build a more efficient and effective solution. |
| 57 | Select the paradigm or the combination of more programming paradigms appropriate to address scheduling a next-generation software solution. |
| 57 | Use scripting languages in enterprise software programming solutions contemporary. |
| 57 | Develop web applications that access and process huge volumes of data emerging through last generation languages. |

### *3.4.2 Web Applications*

Students understand, develop concepts and/or realise projects in following aspects of web applications:

| Course Annex Nr. | Web Application Competences |
|---|---|
| 11 | ● Competences to create web applications using modern languages and frameworks.<br>● Competences to create, configure and use services available through different technologies.<br>● Competences to use various techniques and frameworks as a part of web-based application development process.<br>● Knowledge and understanding of modern technologies, patterns and programming languages used in enterprise systems.<br>● Knowledge and understanding of fundamental rules of software testing. |
| 60 | Identify key areas of development and manifestations of Future Internet and its applicability in the development of Internet-based solutions. |
| 60 | Select the combination of protocols, paradigms and approaches best suited to the requirements of immediacy, scalability and fault tolerance of an Internet-based solution Internet programming. |
| 60 | Apply languages and current development of the client part of Internet-based solutions and applications web protocols. |
| 60 | Using the paradigm of cloud computing, tools and most popular approaches for the development of the server portion of an Internet-based programming solution. |

### *3.4.3 Mobile Systems*

Students understand, develop concepts and/or realise projects in following aspects of basic mobile systems:

| Course Annex Nr. | Mobile Systems Competences |
|---|---|
| 9 | Familiarization with fundamentals of geolocalization and spatial data on mobile devices.<br>Mastering programming skills needed for app development and environment on iOS, WindowsPhone and iOS. |

| | |
|---|---|
| 9 | Student understands and knows different techniques and technologies of developing apps for mobile devices with special attention paid to processing data on mobile devices.<br>Student is able to :<br>● apply development tools and techniques appropriate for WindowsPhone platform<br>● apply development tools and techniques appropriate for Android devices<br>● develop apps for android platform<br>● develop apps for WindowsPhone platform |
| 46 | The course deals with the use of mobile devices as runtime environments for applications. It is demonstrated how we can use various technologies (like client-server communication, XML-Sockets, etc). It is demonstrated how to create and test platform-independent, rich multimedia programs. We will discuss the opportunities and limitations of various mobile technologies (like smartphones, smartpens, tablets, etc.). |
| 46 | Students can assess the possibilities of mobile devices as an interface for information systems and identify specific scenarios, in which the application of mobile devices show a considerable added value.<br>Students are able to design, define and implement appropriate user interfaces for mobile interfaces.<br>Students know the limitations, risks and opportunities of mobile applications and devices. |
| 61 | Analyze, design and develop applications based on Internet communication services for mobile terminals applications by selecting appropriate platforms and tools. |
| 61 | Analyze, design and develop prototypes based on physical objects connected to the Internet by using specialized platforms, applying design patterns and appropriate interaction. |
| 61 | Conceptualize, design and validate digital experiences based on the integration of physical objects connected and accessible Internet services through mobile terminals. |

### *3.4.4 Computer Vision*

Students understand, develop concepts and/or realise projects in following aspects of computer vision:

| **Course Annex Nr.** | **Computer Vision Competences** |
|---|---|

| | |
|---|---|
| 30 | * Resolution, Sampling, Color Imaging<br>* Image processing: Image error correction, edge detection<br>* Segmentation: based on edges or regions<br>* Image compression: predictive coding, JPEG, MPEG<br>* Image vision: motion detection, object tracking<br>* 3D Vision: 3D Recording and Reconstruction<br>* Applications and Programming Methods |
| 30 | Ability to explain an image acquisition process (2D and 3D)<br>Ability to analyse image sequences to detect changes and objects<br>Ability to estimate project efforts as well as perform feasibility studies in the field of Computer Vision |

### *3.4.5 Security*

Students understand, develop concepts and/or realise projects in following aspects of security:

| Course Annex Nr. | Security Competences |
|---|---|
| 1 | Ability to anticipate possible, non-obvious attack vectors against systems and applications<br>Ability to perform basic security assessment<br>Knowledge how to utilize existing tools and solutions to provide systems' and applications' protection<br>Familiriaty with security-oriented software assessment<br>Knowledge how to apply cryptography to secure data storage and transmission.<br>Familiarity with current trends and methods in systems' security. |

### *3.4.6 Artificial Inteligence*

Students understand, develop concepts and/or realise projects in following aspects of artificial inteligence:

| Course Annex Nr. | Artificial Intelligence Competences |
|---|---|
| 62 | Formulate problems and develop and implement solutions with fuzzy logic. |
| 62 | Analyze optimization problems and propose, develop and implement bio-inspired solutions. |
| 62 | Design and implement Bayesian methods to solve problems and apply learning in real trouble |
| 62 | Design and implement artificial neural networks for application to real problems. |

### *3.4.7 Software Engineering*

Students understand, develop concepts and/or realise projects in following aspects of Software Engineering:

| Course Annex Nr. | Software Engineering Competences |
|---|---|
| 54 | Assess the pertinence of different Software Engineering Process Models, given a particular domain. |
| 55 | Implement a software design, based on patterns, using distributed technologies. |
| 56 | Apply an agile software development model in the construction of a software solution. |
| 56 | Make use of tools to manage the software configuration process. |
| 56 | Make use of tools to manage the software project development. |
| 56 | Deploy tools for software quality assurance. |
| 59 | Conceptualize, design, develop and evaluate the individual computer products, systems, applications and services in the areas of multimedia and gaming interaction. |

### *3.4.8 Software Requirements*

Students understand, develop concepts and/or realise projects in following aspects of Software Requirements:

| Course Annex Nr. | Software Requirements Competences |
|---|---|
| 54 | Select and apply the appropriate techniques for the elicitation, analysis, negotiation and validation of requirements, given an information system with a specific difficulty. |

| | |
|---|---|
| 54 | Elaborate the set of models of a system, as part of its requirement specification, evaluating its level of compliance with the basic attributes of a well-written requirement specification. |
| 54 | Refine the requirement models of a given system, transitioning from analysis to design. |
| 55 | Design and evaluate alternative solutions to a software problem, applying patterns and design best practices. |

## 3.5 Analysis of Art Cluster

Five (5) out six (6) courses in the cluster Art were described by FHJ and one (1) by UDEUSTO. These are:

| Annex Nr. | University | Art Course Titel |
|---|---|---|
| 31. | FHJ | Story and visualisation 1 |
| 37. | FHJ | 3D Modelling |
| 38. | FHJ | 3D -Modelling and 3D-Animation |
| 45. | FHJ | Visual Communication Basics |
| 47. | FHJ | Video and Animation 2 |
| 66. | DEUSTO | Artistic expression |

*Table 3.5.1 List of courses categorised in the category "Art".*

Like in the other clusters the learning objectives and comptences from the courses in the art cluster where gathered and categorised according to the aspects of art they cover.

### *3.5.1 Artistic Skills*

Students understand, develop concepts and/or realise projects in following aspects of artistic skills:

| Course Annex Nr. | Artistic Skills Competences |
|---|---|
| 31 | Comprehensive artistic and theoretic skills in the field of time-based media |
| 37 | • Modelling of simple and medium-complexity objects<br>• Creating a variety of materials and surfaces<br>• Scene layout, management, optimization and lighting<br>• Simulation of realistic lighting situations<br>• Still image rendering |

| | |
|---|---|
| 45 | Analytical work on perception, basics of visual communication: conceptual drafting, drawing, photographic representation, artistic formulation, nature studies, analogue and digital draft techniques, ethics of design, iconography, creativity |
| 45 | Basic knowledge of drafting methods, handicraft training |
| 47 | Comprehensive artistic and theoretic skills in the field of time-based media |
| 67 | Apply techniques of artistic expression on morphology, color, textures etc." |

### *3.5.2 3D and Animation*

Students understand, develop concepts and/or realise projects in following aspects of 3D and animation:

| Course Annex Nr. | 3D and Animation Competences |
|---|---|
| 37 | Basic concepts and usage of digital 3D technology. Fields of use include visualisations, still images and simulations in the graphical and artistic design process. |
| 37 | Basics of Information Technology for designers as well as of 3D |
| 38 | Animation, special techniques, various render technologies, post production |
| 38 | Basics of Programming for designers as well as of 3D |
| 47 | Design and development of 2D and 3D animation with and without motion tracking technologies. Professional use of respective analogue and digital tools. |

### *3.5.3 Storyboards*

Students understand, develop concepts and/or realise projects in following aspects of storyboards:

| Course Annex Nr. | Storyboard Competences |
|---|---|
| 31 | Design and development of storyboards in order to visualise scripts and plan single scenes. Realisation of a script in pictures and concrete design such as perspectives, angle and field sizes. |

## 3.6 Analysis of Transversal Skills Cluster

25 courses were described that fell in the category of transversal skills, 14 of them described by AGH-UST, 6 by FHJ and 5 by UDEUSTO. The table below shows the variety such courses with a focus on entrepreneurship (3), marketing (3) and project management (4):

| Nr. | Annex Nr. | University | Titel |
|---|---|---|---|
| 1 | 2. | AGH-UST | Enterpreneurship & Innovation |
| 2 | 3. | AGH-UST | Innovation for engineers: design thinking and business model generation |
| 3 | 4. | AGH-UST | International Project Management |
| 4 | 5. | AGH-UST | IT project organization |
| 5 | 6. | AGH-UST | Knowledge management |
| 6 | 7. | AGH-UST | Leadership and Team Management |
| 7 | 8. | AGH-UST | Marketing |
| 8 | 10. | AGH-UST | Usability Engineering |
| 9 | 12.2. | AGH-UST | Design thinking |
| 10 | 12.3. | AGH-UST | Patents, Copyrights and law of intellectual property |
| 11 | 12.4. | AGH-UST | Security in e-business |
| 12 | 12.5. | AGH-UST | Creative Thinking |
| 13 | 12.6. | AGH-UST | Marketplace simulation |
| 14 | 12.7. | AGH-UST | Internet marketing |
| 15 | 14. | FHJ | Entrepreneurship and Business Models |
| 16 | 20. | FHJ | International Marketing Entry Strategies |
| 17 | 29. | FHJ | Basics of Project Management |
| 18 | 33. | FHJ | Business Planning (KPI's, Project Evaluation) |
| 19 | 40. | FHJ | Entrepreneurship |
| 20 | 41. | FHJ | International Business |
| 21 | 57. | DEUSTO | Software Project Management |
| 22 | 62. | DEUSTO | Research, development and technological innovation |
| 23 | 63. | DEUSTO | Research seminar |
| 24 | 64. | DEUSTO | Academical directed works |
| 25 | 65. | DEUSTO | ICT’s multidisciplinary applications |

*Table 3.6.1 List of courses categorised in the category “Design”.*

Like in the other clusters the learning objectives and comptences from the courses in the transversal skills cluster where gathered and categorised according to the various aspects of transversal skills they cover.

### *3.6.1 Business Studies*

Students understand, develop concepts and/or realise projects in following aspects of business studies:

| Course Annex Nr. | Business Studies Competences |
|---|---|
| 2 | Explain the selected theories of business models and analyze the weak and strong points of the core models/frameworks.<br><br>Build business model Canvas and make pitch for potential investors. |
| 3 | Application of business model generation methodology in developing new businesses<br><br>Application of design thinking methodology in developing new products and services.<br><br>Knowledge of the basics of design thinking and business model generation methodologies.<br><br>Understanding why it is necessary to do learn about clients expectations, needs and experiences while developing new products. |
| 12.4 | The design and implementation of information security in e-business systems.<br><br>E-business systems include both business to business systems and business to consumer systems – more frequently classed as e-commerce. |
| 12.6 | Analysis of market research data<br>Formation of an overall business strategy<br>Strategic and tactical decisions with the goal to become profitable and to be the best competitor in the industry. |

| | |
|---|---|
| 14 | Methods of strategic management: definition of visions, missions and goals, SWOT analysis etc.<br>Analysis of demand/supply, business environment and trends;<br>Creative generation and evaluation of ideas; methods of structuring and evaluating ideas in the business context;<br>Innovation management in corporations;<br>Design and evaluation of business plans;<br>Diversified businesses: evaluation of pros/cons and synergies; Optional contents can contain:<br>Opportunities of and limits to corporate growth;<br>Innovation in marketing: consumer segmentation, positioning, selection of marketing-mix, etc. |
| 14 | Ability to apply methods of evaluating, reflecting on and innovating business models.<br>Control various stages of innovation processes while managing internal and external communication and reacting to arising conflicts.<br>Strategic competence which they can be applied in their professional practice.<br>Ability to critically reflect on established processes, monitor target achievement and fulfil strategic controlling tasks. |
| 33 | • Preparation, conception and creation of professional business plans that will convince decision makers, investors and banks.<br>• Find, plan and control of key performance indicators (KPI)<br>• Controlling business ideas and investments with business plans<br>• Evaluation of projects (concepts, instruments, limits)<br>• Project performance measurement<br>• Case studies |
| 40 | Structured overview of the principles in business studies and management.<br>Competences in solving conflicts in organizations and assessing risks in IT projects |
| 41 | Basic understanding of the global business environment, especially with regards to political, economic, legal and cultural issues |

### *3.6.2 Collaboration, Communication and Negotiation Skills*

Students understand, develop concepts and/or realise projects in following aspects of collaboration, communication and negotiation skills:

| Course Annex Nr. | Collaboration, Communication and Negotiation Competences |
|---|---|
| 2, 3, 5, 20 | Ability to take responsibility and collaborate with others when working in a team. |

| | |
|---|---|
| 7 | Ability to cooperate in a diverse team, sensitivity to diversity, communication skills as well as negotiation skills<br><br>Student has the knowledge and understands group dynamics and team building process - Team Development Model of Tuckman<br><br>Student knows and understands the process of managing diversity in a team |
| 26 | Ability to actively take part in newsgroups and blogs as well as in public discussions and incorporate the gained knowhow into his/her own work. |
| 54 | Interpersonal Communication: Interacting positively with other persons through empathetic listening and through clear, assertive expression of what one thinks and/or feels, by verbal and non-verbal means. Level 1: Establishing good dialogue with classmates and lecturers, listening and speaking clearly and assertively. |
| 55 | Teamwork: Actively joining and participating in the attainment of shared objectives with other persons, departments and organisations. Level 2: Contributing to the consolidation and development of the team, fostering communication, balanced distribution of work, good team atmosphere and cohesion. |
| 52 | Teamwork: Integrate and collaborate actively in achieving common goals with other people, areas and organizations. Level 1: Participate and collaborate actively in the team tasks and generate confidence, cordiality and orientation to the joint task. |
| 58 | Written communication. Interact effectively with others through explaining what you think and / or feel, through writing and graphics support expression. Level 2. Communicate with ease in writing, structuring text content and graphics support to facilitate the understanding and interest of the reader on writings. |
| 63 | Written communication. Interact effectively with other people through the clear expression of what you think and / or feel, through writing and graphics support. Level domain: 3. be convincing by written communication, demonstrating a style in the organization and expression of the content in long and complex writings. |
| 64 | Express clearly ideas, knowledge and feelings through words, adapting to the characteristics of the situation and the audience to gain their understanding and adherence. |
| 64 | Domain level. Propose and build team solutions to problems in various areas, with a global vision. |
| 66 | Written communication. (Level 2) |

### *3.6.3 Project Management*

Students understand, develop concepts and/or realise projects in following aspects of project management:

| Course Annex Nr. | Project Management Competences |
|---|---|
| 4 | Explain the main project management influences, project stakeholders; Characterize project team and explain project life cycle and phases. Know how to manage human resources and solve conflicts in team. Know how to develop a project management plan Know how to develop project management measures (in terms of time, costs and quality management). |
| 29 | Familiarity with the most relevant project management terms, techniques, tools and methods, as well as with the importance of team building and team culture. Familiarity with agile project management (in specific SCRUM) and some of its methods in a dynamic environment (e.g. software development). A common understanding of projects and their complexity. Know how to reducing risks in international projects, communicating with project team members/management/suppliers/customers efficiently. Detecting and solving problems |
| 40 | Competences in solving conflicts in organisations and assessing risks in IT projects |
| 13 | Define and set objectives in order, planning individual activities in the medium and long term (from several weeks to six months). |
| 56 | Planning. Deciding effectively the objectives, priorities, methods and controls for work to be done, by organising tasks within deadlines and available means. Level 2. Taking part and getting involved in the organised undertaking of group work, foreseeing the tasks, times and resources needed to achieve desired results. |
| 49 | 4) Teamwork, time management, project development |
| 58 | Planning. Effectively determine the objectives, priorities, methods and controls to perform tasks by organizing activities with deadlines and available means. Level 3. Methods and skills to plan the development of a complex project (For example: End of degree project). |
| 58 | manage projects in the field of ICTs, management techniques within knowledge and understanding of the commercial and economic context of the processes of engineering, orientation quality and innovation. |

| | |
|---|---|
| 63 | Capacity for general direction, technical direction and project management research, development and innovation in companies and technology centers in the field of Computer Engineering. |
| 63 | Ability to apply principles related to economics and management of human resources and projects, as well as legislation, regulation and standardization of computing. |

### *3.6.4 Entrepreneurship Competences*

Students understand, develop concepts and/or realise projects in following aspects of entrepreneurship:

| Course Annex Nr. | Entrepreneurship Competences |
|---|---|
| 2 | Define entrepreneurship, innovation and describe types and forms of entrepreneurship and entrepreneurial orientation.<br>Ability to explain how to start a Small Business.<br>Fundamental knowledge of the sources of capital available for small and medium sized enterprises and various legal form for the new business.<br>Knowledge of the basics of entrepreneurship, becoming an entrepreneur. |
| 12.6 | Analyze market research data, form an overall business strategy and then make a set of strategic and tactical decisions with the goal to become profitable and to be the best competitor in the industry. |
| 14 | [1] Methods of strategic management: definition of visions, missions and goals, SWOT analysis etc.<br>[2] Analysis of demand/supply, business environment and trends;<br>[3] Entrepreneurship as a process: idea generation, evaluation, implementation;<br>[4] Creative generation and evaluation of ideas; methods of structuring and evaluating ideas in the business context;<br>[5] Innovation management in corporations;<br>[6] Design and evaluation of business plans;<br>[7] Diversified businesses: evaluation of pros/cons and synergies;<br>Optional contents can contain:<br>[8] Opportunities of and limits to corporate growth;<br>[9] Innovation in marketing: consumer segmentation, positioning, selection of marketing-mix, etc. |

| | |
|---|---|
| 14 | The professional and targeted development of strategies and their implementation as a main driver of a venture's success.<br>Ability to apply methods of evaluating, reflecting on and innovating business models.<br>Control various stages of innovation processes while managing internal and external communication and reacting to arising conflicts.<br>Strategic competence which can be applied in the professional practice.<br>Critical reflection on established processes, monitoring target achievement and fulfiling strategic controlling tasks. |
| 20 | 1. Exploring important market entry modes<br>2. Explain the pros and cons of the different modes to enter a foreign market<br>3. Develop a systematic approach for a market research & analysis<br>4. Identify and analyze factors that influence a firm's choice of entry mode by assessing global market opportunities<br>5. Give a recommendation on an entry mode based on your research results |

### *3.6.5 Other Transversal Skills*

The analysis of the course discriptions revealed a set of other transversal skills and competences like:

| **Course Annex Nr.** | **Creativity Competences** |
|---|---|
| 2 | Demonstrate ability for thinking creatively by generating new ideas and solutions. |
| 3 | Creative thinking (brainstorming, metaphors) |
| **Course Annex Nr.** | **Responsibility Competences** |
| 2 | Ability to take responsibility |
| 58 | design, develop, document and evaluate specific solutions, integrated information technology and communications in any domain that requires taking into account social considerations, economic and business ethics affecting the practice of engineering. |
| **Course Annex Nr.** | **Self-effectiveness Competences** |
| 7 | Student is able to organize and complete his or her tasks by developing his self –effectiveness (time management, presentation skills, delegating etc.) |
| 13 | Time Management: distribute time in a logical way, considering personal aims in the short, medium and long term, and personal and professional areas to be developed. |

| Course Annex Nr. | Leadership Competences |
|---|---|
| 5 | Training leadership skills and teamwork skills. |
| 7 | Student has the knowledge and understands the necessity of self-development in effective leadership |
| **Course Annex Nr.** | **Knowledge Management Competences** |
| 5 | Familiarization with methods of IT project organization.<br>Mastering tools for IT project organization. |
| 6 | Familiarizing with methods of data preprocessing for knowledge acquisition process.<br>Implementation and use of knowledge management systems in an enterprise. |
| **Course Annex Nr.** | **Marketing Competences** |
| 8 | Training active marketing skills.<br>Familiarization with methods of traditional and non-traditional advertising.<br>Mastering tools for IT building and managing marketing strategy. |
| 12.7 | Basic knowledge in digital marketing. The course covers all major digital platforms such as mobile, social media and search (paid and organic). |
| 63 | Establish a logical and applied innovative process order to market distilling the ideas into business opportunities by applying different methodologies for innovation management. |
| **Course Annex Nr.** | **Laws of intellectual property Competences** |
| 12.3 | Basic knowledge of the law of intellectual property, with major emphasis on [European] patent law.<br>Basic knowledge on copyrights, trademarks and trade secrets, comparisons of what can and cannot be protected, and what rights the owner does and does not obtain. |
| **Course Annex Nr.** | **Research Competences** |
| 20 | Research skills |
| 12.1 | Empirical research skills involving novel user interfaces |
| 26 | Familiarity with the basics of scientific work and state of the art of research in design |
| **Course Annex Nr.** | **E-Business Competences** |
| 12.4 | The design and implementation of information security in e-business systems.<br>Basic knowledge of the law of information security. |
| **Course Annex Nr.** | **Problem Solving Comptences** |

| | |
|---|---|
| 53 | Problem Solving: To identify, analyze and define the significant elements making up a problem in order to solve it with criteria and effectively. Level 2: To use one's own experience and criteria in the analysis of the causes of a problem and build up a more effective and efficient solution. |
| 57 | Problem resolution. CG9.2. Use your experience and judgment to analyze causes of a problem and build a more efficient and effective solution. |
| **Course Annex Nr.** | **English Comptences** |
| 59 & 61 | Communication in foreign language (English). Understand and be understood verbally and written using (especially important in the process of European Convergence for the expansion of the international dimension of qualifications) English language. Level 2: Communicate fluently so argued in another language in texts of some complexity. |

# 4 Projects in the Digital Game Sector

UDEUSTO took the opportunity of the analysis and provided six (6) project descriptions.

The project "MakeWorld: learning Science through Computational Thinking" aims to create the GAMIFIED platform to play, remix and create worlds and stories, while learning STEM related knowledge, skills and competences. The platform supports STEM learning by defining a methodology that leverages social and gamified platforms, story-telling, computational thinking, social assessment and personalized learning. The full description of the project can be found in Annex 48.

The project "Kineage: Adapted Kinect game for exercise and fun" the use of devices that do not require the use of remote controls, such as the Kinect sensor. This sensor recognizes the movements of the user, who controls the game with the body.
On the market there exist various products made with Kinect. Nevertheless, these games do not work with users in wheelchairs, not being able to use this type of games. There are also older people with physical disabilities, such as those with muscular dystrophy, where in most cases low mobility in either of the upper extremities is presented. These people are also not able to access this type of serious game, since it is not adapted to their specific needs. Therefore, there is a lack of technological resources adapted to the specific needs of each user, leaving a great part of the ageing population without access to products that can improve their health, quality of life, and the enjoyment of their leisure time. Physical rehabilitation is often necessary for individuals who suffer an injury or illness which causes a physical impairment, in order to restore movement and strength through supervised repetitive exercises. Alternatively, physical activity also improves cognitive performance and reduces cognitive decline. This tool focuses on therapeutic aspects of both cognitive and physical rehabilitation for older adults, as it improves memory by performing mental activities and physical rehabilitation at the same time. This way, exercise, rehabilitation and the enjoyment of an accessible leisure is promoted, also reducing the digital divide. The full description of the project can be found in Annex 68.

The project "Psicoestimula: Gamification and psychostimulation for elderly people" aims to design 2 games for improvement physical and cognitive condition of the elderly. The main objective of the system is to help this group improve some of their skills, such as spatial vision, memory or attention. The full description of the project can be found in Annex 69.

The project "eTangram: Psychostimulation technology for elderly people on the Tangram game" has been specially designed for producing a transient increase in psychomotor activity for the elderly. It aims to desing and develop a hardware and a software prototype based on the Tangram game to train the physical capacity and memory of elderly people, to desing and develop a colaborative tool for patients and specialists and to monitor objective variables of the patients such as time and errors. The full description of the project can be found in Annex 70.

The “AUTOGAME” project aims to develop a serious game for diagnosis and troubleshooting on wiring diagrams, and is part of the area of automotive electricity. “Autogame” is a game designed as a complement to classroom training materials, in which students must identify faults in electrical diagrams, the reason why such damage has occurred and the component that failed. Wiring diagrams are presented to students and they must identify a single fault in each diagram. After doing this, they can continue with a new activity. The full description of the project can be found in Annex 71.

“JolasTEA” is a project targeting children with ASD problems and aims to treat people with ASD, focusing on the areas affected by this disorder. jolasTEA is composed by three large integrated and complementary modules, through which are collected and analyzed objective indicators. The first module is responsible of collecting personal information from people with ASD; The second module consists on serious games, in which the areas of involvement of this disorder work, giving priority to encourage interest and work towards people and interaction with them. Along the serious games, the system stores objective variables that allow professionals to keep track of the progress that the person is doing. Finally, the third module is responsible of analyzing the stored indicators in the first two sections, showing graphically to psychologists, pedagogues or responsible persons, the results and progress of the user. The full description of the project can be found in Annex 72.

Biofeedback uses information on certain physical and biological functions to design a Multi-sensor system for implementing biofeedback as a human-computer interaction technique in a game involving driving cars in risky situations. The sensors used are: Eye Tracker, Kinect, pulsimeter, respirometer, EMG (Electromiography) and GSR (Galvanic Skin Resistance). The full description of the project can be found in Annex 73.

# 5 Summary and Discussion of the Results

This report aimed to analyse the course descriptions gathered by the european partners in areas that are importand and useful in the game industry sector in terms of the competence development they support. UDEUSTO, AGH-UST and FHJ provided an overall number of 70 course discriptions on a template designed by the project consortium.
Starting the analysis these courses were clustered in 4 categories: design (19), programming (20), art (6) and transversal skills (25). Most courses were gathered in the areas of design and transversal skills. This high difference in the amount of courses in the various areas shows the emphasis given on each in the project participating university. None of the participating universities has a specific degree on game design, they do however offer courses in various disciplines that support the development of skills and competences needed in the game industry sector.
Within each category the competences were clustered in terms of specific areas that were extracted from thourough analysis of the course discriptions.

In the category of design we came up with 11 study areas. These are:

1. Interaction design
2. Interface design
3. User experience design
4. Usability design
5. Psychology of perception
6. Multimedia design
7. User-centred design
8. Video design
9. Animation design
10. Sound design, and
11. Writing

In the category of programming we came up with 7 study areas. These are:

1. Basic programming
2. Web applications
3. Mobile systems
4. Computer vision, and
5. Security
6. Software Engineering
7. Software Requirements

In the category of art we came up with 3 study areas. These are:

1. Artistic skills
2. 3D and animation, and
3. Storyboards

In the category of transversal skills we came up with 5 study areas. These are:

1. Business studies

2. Collaboration, communication and negotiation
3. Project management
4. Entrepreneurship, and
5. Other transversal skills including
    a. Creativity
    b. Responsibility
    c. Self-effectiveness
    d. Leadership
    e. Knowlegde management
    f. Marketing
    g. Laws of imtelectual roperty
    h. Research, and
    i. eBusiness
    j. Problem solving
    k. English

The order of the reported clusters and areas of study is arbitrary and is not expressing significance or any specific weight.
The analysis of the comptences in terms of clusters and areas of study in each cluster helps us to become an overview of all aspects needed or helping learners to work in the game industry sector. The listing of the exact competences can help the partners of the Gamehub project in the design of the learning materials and the design of the overall training provided. Moreover, Ukrainian partners can find many interesting information about the context (course description, type/class format, ECTS, level, prerequisites, assignements, evaluation/grading, references, etc) in which each particular competence can be taught.
It will be very interesting in the furure of the project to compare what competences the educators think the game industry needs, as indicated by the above analysis, and what competences the game industry wishes to have, as will be indicated by the results of the GameHub survey that is carried out by deliverable 1.2. Report on ICT and digital GI at technology enhanced learning and service at partner country – Ukraine.

# Annex 1

**Name of provider / GameHub partner institution / country: AGH-UST**

| | |
|---|---|
| **Title** | Cybersecurity |
| **Institution / Department** | Management |
| **Lecturer** | N/A |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Participation in lectures 14 h<br>Realization of independently performed tasks 30 h<br>Completion of a project 45 h<br>Participation in laboratory classes 14 h |
| **ECTS** | 3 |
| **Level** | Second-circle study |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Course was developed based upon the evolving effects of cyber security in today's world and because of the fast technological pace of never ending resources and technology innovations that makes an adversarial threat more frequent to various types of cyber attacks and risk analysis. This course will assist the student in learning how to assess and evaluate cyber security risks and to conduct computer security audits in the ever changing and fast pace environment of technology |
| **list/enumeration of themes/topics that should be mastered during the course** | 1. Introduction<br>Basic definitions and classification. Defence-in-depth.<br>2. Network and communication<br>Communication protocols and their vulnerabilities. Wireless networks. OS-related issues.<br>3. Web applications<br>Common issues and exploits of web applications. Attack vectors and their anticipation. Detection and prevention of attacks.<br>4. User-targetted attacks<br>Technical and socio-technical attacks methods. Malware – classifications and typical modus operandi. Methods of user's authentication.<br>5. Other security-related risks<br>Physical security, data retention and redundancy, risk assessment and management.<br>6. Standards and best practices<br>International (e.g. ISO 2700x) and industrial (e.g. PCI) norms and specifications. Security audit and assessment |
| **Competences/Learning objectives** (max. 1.500 | Is able to anticipate possible, non-obvious attack vectors against systems and applications<br>Is able to perform basic security assessment |

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| characters) | Knows how to utilize existing tools and solutions to provide systems' and applications' protection<br>Is familiar with security-oriented software assessment<br>Knows how to apply cryptography to secure data storage and transmission.Is familiar with current trends and methods in systems' security |
| **Outcomes**<br>(max. 1.500 characters) | Penetration tests<br>A number of guided penetration tests of a provided web application<br><br>Network traffic control<br>Set-up of a sample network, rules-based firewall configuration.<br><br>System security<br>Analysis and design of security measures for the provided IT system.<br>Students are required to complete an assigned case-study project related to either security assessment or designing of security measures for the defined system. |
| **Assignments**<br>(example if available) | |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | The final grade is a weighted average of the exam result, laboratory class grade and the grade of the student's project. If any of the grades are negative, the final grade will also be negative. |
| **References**<br>(max. 3 that are key for the programme/project) | 1 Ross Anderson, „Security Engineering", Wiley Publishing 2008<br>2 Jon Erickson, „Hacking: The Art of Exploitation", No Starch Press 2008<br>3 Paco Hope, „Testowanie bezpieczeństwa aplikacji internetowych. Receptury", Helion 2010<br>4 Stuart McClure, Joel Scambray, George Kutz, „Hacking Exposed: Network Security Secrets and Solutions", McGraw-Hill 2009<br>5 John R. Vacca, Morgan Kaufmann, „Computer and Information Security Handbook", Morgan Kaufmann 2009 |
| **Hardware and software required** | |
| **Webpage** | |

# Annex 2

**Name of provider / GameHub partner institution / country: AGH University of Science and Technology**

| | |
|---|---|
| **Title** | Enterpreneurship & Innovation |
| **Institution / Department** | Management |
| **Lecturer** | Kowal Dominik, Ph. D. |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Participation in project classes 28h<br>Realization of independently performed tasks 27 h<br>Completion of a project 25 h<br>Preparation of a report, presentation, written work, etc. 20 h<br>Contact hours 25 h |
| **ECTS** | 5 |
| **Level** | Second-cycle studies |
| **Prerequisite(s)** | Prerequisites and additional requirements not specified. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | 1.Course overview, objectives and requirements. Introductions. Personal objectives.<br>2.We will discuss the definition of Innovation (innovation vs. creativity) and Design Thinking and the relevant models. The concept of "T-shaped" people will be introduced.<br>3.Design Thinking skills will be introduced and practiced<br>4.We will discuss the Entrepreneurship fundamentals. The concept and the essence of entrepreneurship Entrepreneurial competencies.<br>5.Strategic Execution Framework (SEF). Models Business Model Generation: Introduction. The role of the business model.<br>6.The Business Model Canvas – strategic management and entrepreneurial tool. It allows students to describe, design, challenge, invent, and pivot their business model.<br>7.We will discuss what is the business plan and what it is used for. Functions of the business plan. Discussion of the golden rules to keep in mind in writing a business plan.<br>8.Final Pitches to Judges<br><br>Student learn how to run and develop her/his own start up, business, that can also be implemented in Game Industry |
| **list/enumeration of themes/topics that should be mastered during the course** | 1.Entrepreneurship and Small Business. Entrepreneurship fundamentals. Personal characteristics and skills of the new venture leaders.<br>2.Managing for innovation. Using innovative Thinking to Generate Business Ideas. From idea to initial business concept.<br>3.Knowledge management fundamentals. Technology transfer |

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| | and commercialization.<br>4.Starting a Small Business. Institutional conditions for running your own business. Choosing a legal form for the new business<br>5.Strategic Execution Framework (SEF). Models Business Model Generation Introduction.<br>6.Business plan. Preparing a Business Plan. Typical structure for a business plan for a start up venture.<br>7.The Marketing Plan. Understanding Potential Target Markets.<br>8.Sources of financing the new venture. Financial Statements. The financial and accounting system<br>9.Small Business Leadership.<br>10.Design Thinking (Empathy, Creative Competence, (re) Define, Ideate, Prototype, Test). |
| **Competences/Learning objectives** (max. 1.500 characters) | Student can demonstrate her/his ability for thinking creatively by generating new ideas and solutions. Student can demonstrate her/his ability to take responsibility and collaborate with others when working in a team. Students will be able to: Explain the selected theories of business models and analyze the weak and strong points of the core models/frameworks. Students will be able to build business model Canvas and make pitch for potential investors. Student can define entrepreneurship, innovation and describe types and forms of entrepreneurship and entrepreneurial orientation. Student is able to explain how to start a Small Business. She/He knows fundamental the sources of capital available for small and medium sized enterprises and various legal form for the new business. Student knows the basics of entrepreneurship, becoming an entrepreneur. |
| **Outcomes** (max. 1.500 characters) | Student:<br>1. Knows and uses Gamestorming tools such as Draw the Problem, Elevator Pitch, and 5 Whys, I Like/I Wish, Start – Stop – Continue etc.<br>2. Defines innovation and creativity<br>3. Explains and practices Design Thinking and the relevant models<br>4. Explains the concept of “T-shaped” people.<br>5. Understands the Entrepreneurship fundamentals, the concept and the essence of entrepreneurship Entrepreneurial competencies.<br>6. Explains the Strategic Execution Framework (SEF). Models Business Model Generation: Introduction. The role of the business model.<br>7. Understands and practices the Business Model Canvas – strategic management and entrepreneurial tool.<br>8. Develops Business plan. Knows functions of the business plan. Discusses the golden rules to keep in mind in writing a |

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| | business plan.<br>9. Presents final pitch to Judges |
| **Assignments** (example if available) | Students will prepare and defend a business model (The Business Model Canvas). At first students will be asked to prepare a number of different ideas for their business. They will present them and after brainstorming presentation of ideas they will select one that they will work on in groups. During preparation period, the students will be given consultations (on campus or, on demand by distance learning).<br>The course will be finalized by presentation of SEM and Business Model Canvas for Team Projects.<br>During the meeting all groups , students will present and defend the prepared business models in front of the committee consisting of other students and possibly industrial, VC representatives. Then presentations will be held using the PechaKucha 20×20 format and judged by industry, financial experts.<br>Additionally, they will be asked to write a personal short paper on their experiences of the team work, cross-team critiques and giving own examples of their taking the responsibility. |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Activity during classes, Project |
| **References** (max. 3 that are key for the programme/project) | 1.J. Longenecker, J. Petty ,L. Palich, F. Hoy Small Business Management: Launching and Growing Entrepreneurial Ventures<br>2.J. Caan, Start Your Business in 7 Days: Turn Your Idea Into a Life-Changing Success, 2013<br>3.A. Osterwalder, Y. Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, 2010<br>4.D. Gray, S. Brown, J. Macanufo, Gamestorming: A Playbook for Innovators, Rulebreakers, and Changemakers Paperback –2010<br>5.Start Your Own Business, Fifth Edition: The Only Start-Up Book You'll Ever Need, by The Staff of Entrepreneur Media (Editor), 2010<br>6.W. Markowski, ABC small business'u, Wydawnictwo MARCUS s.c., Łódź 2014. |
| **Hardware and software required** | not specified |
| **Webpage** | http://syllabuskrk.agh.edu.pl/2015-2016/pl/magnesite/study_plans/stacjonarne-zarzadzanie-international-management/module/zzp-2-401-im-s-enterpreneurship-innovation |

# Annex 3

**Name of provider / GameHub partner institution / country: AGH-UST**

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|---|---|
| **Title** | Innovation for engineers: design thinking and business model generation |
| **Institution / Department** | Management |
| **Lecturer** | dr eng. Dominik Kowal |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Preparation for classes 22 h<br>Workshops participation 28 h<br>Preparation of a report, presentation, written work, etc. 50 h |
| **ECTS** | 4 |
| **Level** | First-Cycle Studies |
| **Prerequisite(s)** | none |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Today, technological knowledge is only a part of what it takes to develop innovative products. In this course students will learn the basis of two, currently the most popular, methods of developing innovations: business model generation and design thinking. Both of them are widely applied on different levels, from global corporations to small start-ups, helping to turn ideas and technologies into successful products. The course will be organized as workshop sessions with some mini-lectures and considerable individual work. All students will be encouraged to develop their own projects of innovations using these methods.<br><br>Students will learn how to build business model for Game Industry. |
| **list/enumeration of themes/topics that should be mastered during the course** | n/a -- see below |
| **Competences/Learning objectives** (max. 1.500 characters) | 1. creative thinking (brainstorming, metaphors), team-work and presentation skills<br>2. Student can apply business model generation methodology in developing new businesses.<br>3. Student can apply design thinking methodology in developing new products and services.<br>4. Student knows the basics of design thinking and business model generation methodologies.<br>5. Student understands why it is neccessary to do learn about clients expectations, needs and experiences while developing new products. |
| **Outcomes** (max. 1.500 characters) | 6. creative thinking (brainstorming, metaphors), team-work and presentation skills<br>7. Student can apply business model generation methodology in developing new businesses. |

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| | 8. Student can apply design thinking methodology in developing new products and services.<br>9. Student knows the basics of design thinking and business model generation methodologies.<br>10. Student understands why it is neccessary to do learn about clients expectations, needs and experiences while developing new products. |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Grades will be based on students own projects of innovations (both written version and presentation during classes will be evaluated). Active participation in classes is also obligatory. |
| **References** (max. 3 that are key for the programme/project) | IDEO. (bd). Human Centered Design Toolkit. 2nd Edition. http://www.designkit.org/resources/1<br><br>Institute of Design at Stanford. (bd). Bootcamp Bootleg. http://dschool.stanford.edu/wp-content/uploads/2013/10/METHODCARDS-v3-slim.pdf<br><br>Osterwalder A., Pigneur Y. (2009). Business Model Generation. Amsterdam: OSF. |
| **Hardware and software required** | none |
| **Webpage** | n/a |

# Annex 4

**Name of provider / GameHub partner institution / country: AGH University of Science and Technology**

| | |
|---|---|
| **Title** | International Project Management |
| **Institution / Department** | Management |
| **Lecturer** | Marek Michalski, Ph. D. |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Participation in project classes 28h<br>Realization of independently performed tasks 60 h<br>Completion of a project 70 h<br>Preparation of a report, presentation, written work, etc. 40 h<br>Contact hours 4 h<br>Examination or Final test 2 h |
| **ECTS** | 8 |
| **Level** | Second-cycle studies |
| **Prerequisite(s)** | Prerequisites: good analytical and problem solving skills as well as a good working knowledge of English. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Students gain knowledge on project management influences and project file cycle including organizational influences such as: culture, communications, and enterprise environmental factors; project stakeholders; project team and characteristics of a project life cycle and phases. Students learn how to manage human resources and get to know conflict resolution methods. Students practice project integration management, especially the development of a project management plan, project management measure development including time, cost and quality management. Students develop project management skills including project integration, communication and risk management and project management life skills including project scope, time, cost and quality management. |
| **list/enumeration of themes/topics that should be mastered during the course** | 1.Introduction to Project Management<br>2.Organizational Influences and Project Life Cycle<br>3.Project Management Processes<br>4.Project Integration Management<br>5.Project Scope Management<br>6.Project Time Management<br>7.Project Cost Management<br>8.Project Quality Management<br>9.Project Human Resource Management<br>10.Project Communications Management<br>11.Project Risk Management |
| **Competences/Learning objectives** | Student explain the main project management influences, project stakeholders; |

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| (max. 1.500 characters) | Student characterize project team and explain project life cycle and phases.<br>Student know how to manage human resources and solve conflicts in team.<br>Student develops a project management plan<br>Student developers project management measure ( in terms of time, costs and quality management). |
| **Outcomes**<br>(max. 1.500 characters) | Student is able to:<br>1. Use MS Project<br>2. Create a Task List<br>3. Set Up Resources<br>4. Assign Resources to Tasks<br>5. Format and Share the Plan<br>6. Track Progress on Tasks<br>7. Prepare Fine-Tuning Task Details<br>8. Prepare Fine-Tuning Resource Details<br>9. Prepare Fine-Tuning Assignment Details<br>10. Prepare Fine-Tuning the Project Plan<br>11. Oraganize Project Details<br>12. Track Progress on Tasks and Assignments<br>13. View and Report Project Status |
| **Assignments**<br>(example if available) | As part of the course, students must prepare and present group projects. |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | Exam, Project work, Test |
| **References**<br>(max. 3 that are key for the programme/project) | The primary text books are:<br>• PMBOK® Guide and Standards (5th Ed), Project Management Institute (PMI), 2013.<br>• Microsoft Project 2013 Step by Step, Microsoft Press 2013.<br>Detailed course slides will be provided.<br>The course will make use of the AGH e-learning platform.<br>Case studies will provide real life examples of project management processes at mayor international companies. |
| **Hardware and software required** | Microsoft Project 2013 |
| **Webpage** | http://syllabuskrk.agh.edu.pl/2015-2016/en/magnesite/study_plans/stacjonarne-zarzadzanie-international-management/module/zzp-2-302-im-s-international-project-managemant |

# Annex 5

**Name of provider / GameHub partner institution / country:** AGH University of Science and Technology, Krakow, Poland

| | |
|---|---|
| **Title** | IT project organization |
| **Institution / Department** | AGH University of Science and Technology, Krakow, Poland |
| **Lecturer** | Dyduch Tadeusz M.Sc.<br>Żabińska-Rakoczy Małgorzata Ph.D. Eng. |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Participation in lectures 14 h<br>Preparation for classes 45 h<br>Participation in laboratory classes 14 h<br>Preparation of a report, presentation, written work, etc. 15 h<br>Realization of independently performed tasks 12 h |
| **ECTS** | 4 |
| **Level** | not specified |
| **Prerequisite(s)** | Recommended completion of Software Engineering course, or Information Systems Design. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Organization of IT project, because of its extraordinary specificity is a key issue in the process of design in the domain of computer science. The goal of the subject is to present students, elements of IT design process and its management issues, their relations, activities performed and artifacts produced. Typical widespread methods, especially IT systems development models and production methodologies (eg. RUP, MSF) based on them are shown. Also adaptative ones (eg. principles of Agile, TDD, XP, Scrum) and the so-called organizational ones (as eg. CMMI, ITL, COBIT) are described. |
| **list/enumeration of themes/topics that should be mastered during the course** | ● Exercises and discussion on preliminary phases of IT projects: estimation of cost, time.<br>● Methods of presentation of work schedule – diagrams.<br>● Completion of the project team and its issues. Team structure: roles in the team.<br>● Managerial decisions.<br>● Choice of the methodology.<br>● Planned sequence of works, artifacts delivered.<br>● Comparison of methodologies.<br>● Practical application of methods and tools to own IT projects. |
| **Competences/Learning objectives** (max. 1.500 characters) | Training leadership skills and teamwork skills.<br>Familiarization with methods of IT project organization.<br>Mastering tools for IT project organization. |
| **Outcomes** (max. 1.500 characters) | Students can be leaders of small project teams. They are also able to collaborate with each other as members of IT project |

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| | team and understand the necessity of cooperation as well as roles in the design team.<br>A student is able to define project goals, scope and context according to needs. Students are able to prepare a schedule for IT projects, present it in graphical form and estimate costs of project phases. A student knows how to create documentation of the whole project.<br>A student understands methods of IT project organization. Knows management rules of software development processes, organization and services of IT infrastructure. Student possesses knowledge on security issues of IT systems. Students have knowledge concerning tools supporting IT project management and their functional possibilities. They know the procedures of key functions applications. |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | 1.To obtain the positive final mark, it is necessary to have positive grades from all the laboratory excercises and an exam.<br>2.The arithmetic average (av) from all the meetings and exercises as well as an exam is calculated.<br>3.The final grade is fixed on the basis of the following dependency:<br>if av>4.75 then OK:=5.0 else<br>if av>4.25 then OK:=4.5 else<br>if av>3.75 then OK:=4.0 else<br>if av>3.25 then OK:=3.5 else OK:=3 |
| **References** (max. 3 that are key for the programme/project) | Belbin “Project team creation”<br>Meredith, Mantel “Project Management”<br>Phillips Joseph “IT Project Management”<br>Other sources<br>CMMI<br>COBIT<br>ISO norms<br>ITIL v3<br>MSF<br>PMI-PMBOK<br>Prince2,<br>RUP |
| **Hardware and software required** | not specified |
| **Webpage** | http://syllabuskrk.agh.edu.pl/2015-2016/en/magnesite/modules/31094 |

# Annex 6

**Name of provider / GameHub partner institution / country:** AGH University of Science and Technology, Krakow, Poland

| | |
|---|---|
| **Title** | Knowledge management |
| **Institution / Department** | AGH University of Science and Technology, Krakow, Poland<br>Faculty of Management |
| Lecturer | Skalna Iwona, Ph.D.<br>Gaweł Bartłomiej Ph.D. Eng.<br>Rębiasz Bogdan D.Sc. Eng. |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Participation in lectures 15 h<br>Participation in laboratory classes 15 h<br>Preparation for classes 30 h<br>Participation in auditorium classes 15 h<br>Realization of independently performed tasks 10 h<br>Completion of a project 15 h |
| **ECTS** | 4 |
| **Level** | Second-cycle studies |
| **Prerequisite(s)** | Required knowledge of statistics methods and office software. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The course concentrates on the meaning of knowledge in business environment. General objective is to analyse concept, role and goals of knowledge management. Following issues are discussed: individual vs. collective knowledge, the concept and meaning of enterprise knowledge resources, classification of enterprise knowledge resources: open and tacit knowledge, sticky and leaky knowledge, knowledge management concept genesis.<br>Students acquire practical knowledge on construction of a data collection system in an enterprise from the perspective of knowledge discovery – by analyzing a case study. The students are prepared for realization of the project of knowledge acquisition from data. They complete a project on the assigned topics and tasks in teams. Finally they discuss project's concepts in the class.<br>This course provides general information on knowledge management which is fundamental for game industry. |
| **list/enumeration of themes/topics that should be mastered during the course** | Definition of notions: data, information, knowledge. Meaning of knowledge in business environment. Individual vs. collective knowledge.<br>The concept and meaning of enterprise knowledge resources. Classification of enterprise knowledge resources: open and tacit knowledge, sticky and leaky knowledge.<br>Knowledge management concept genesis. Concept, role and goals of knowledge management.<br>Key processes of knowledge management: location of |

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| | knowledge resources, knowledge acquisition, knowledge development, knowledge sharing and dissemination, knowledge use and knowledge preservation.<br>Knowledge management levels: normative, strategic and operational management.<br>Methods of knowledge evaluation. Multidimensional knowledge measurement systems.<br>Knowledge processing systems. Knowledge acquisition methods, machine learning principles.<br>Methods of knowledge representation: declarative (propositional and predicate calculus, statements and rules), procedural (frames, semantic webs, decision tables).<br>Components of fuzzy logic in knowledge representation.<br>Record and verification of knowledge bases.<br>Use of hybrid systems and data exploration techniques in knowledge management.<br>Use of classification methods in knowledge acquisition from data – case study.<br>Use of artificial intelligence methods in an enterprise – case study.<br>Familiarizing with knowledge record in various ways of knowledge representation – construction of simple knowledge base.<br>Knowledge management in selected enterprises – case study.<br>Test verifying mastery of knowledge management processes, data mining algorithms and knowledge representation methods.<br>Assigning topics and tasks to teams. Discussion of project's concept.<br>Grouping of objects with selected methods using available statistical packages.<br>Generation of decision trees using available statistical packages.<br>Discovery of associations in data sets.<br>Discussion of project realization status, identification of problems, control of task realization in teams.<br>Formulary knowledge bases for selected examples.<br>Presentation of projects by owners and discussion. |
| **Competences/Learning objectives** (max. 1.500 characters) | Familiarizing with methods of data preprocessing for knowledge acquisition process.<br>Implementation and use of knowledge management systems in an enterprise.<br>Use of artificial intelligence in knowledge management.<br>Expert systems – operating principles and structure. Expert system designing.<br>Construction of a data collection system in an enterprise from the perspective of knowledge discovery.<br>Preparation for realization of the project of knowledge acquisition from data. |

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| **Outcomes** (max. 1.500 characters) | The student:<br>● has teamwork skills<br>● can assess the role and meaning of knowledge resources for enterprise development<br>● is aware of the continuous need to improve knowledge management systems in an enterprises and to extend knowledge with new methods of data mining and knowledge representation<br>● has mastered a basic knowledge on implementation of knowledge management systems in an enterprise<br>● is able of performing analysis using data mining methods, interpreting obtained results and draw conclusions<br>● knows the concept and classification of knowledge resources in an enterprise as well as has a basic knowledge of knowledge management processes in an enterprise<br>● knows contemporary concepts of knowledge management and methods of enterprises knowledge resources measurement<br>● has mastered basic knowledge on artificial intelligence use in knowledge management<br>● has mastered knowledge on hybrid systems application and methods of data mining in knowledge management process<br>● knows basic methods of data mining and knowledge representation |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | tests, presentation, project |
| **References** (max. 3 that are key for the programme/project) | Dalkir K., Liebowitz J.: Knowledge Management – theory and practice, The MIT Press; second edition, New York, 2011. Hislop D.: Knowledge Management in Organizations, Oxford University Press, USA; 2 edition, Oxford 2009.3. Russel S., Norvig P.: Artificial Intelligence: A Modern Approach, Prentice Hall, New Jersey, 2009. |
| **Hardware and software required** | not specified |
| **Webpage** | http://syllabuskrk.agh.edu.pl/2013-2014/en/magnesite/study_plans/stacjonarne-zarzadzanie-i-inzynieria-produkcji-zarzadzanie-innowacjami/module/zzip-2-112-zi-s-knowledge-management |

# Annex 7

**Name of provider / GameHub partner institution / country: AGH University of Science and Technology**

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|---|---|
| **Title** | Leadership and Team Management |
| **Institution / Department** | Management |
| **Lecturer** | Ewa Beck-Krala, Ph. D.<br>Katarzyna Klimkiewicz, Ph.D |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Participation in auditorium classes 28h<br>Participation in lectures 42 h<br>Realization of independently performed tasks 20 h<br>Completion of a project 30 h<br>Preparation of a report, presentation, written work, etc. 20 h<br>Participation in e-learning classes 14 h<br>Preparation for classes 22 h |
| **ECTS** | 8 |
| **Level** | Second-cycle studies |
| **Prerequisite(s)** | The knowledge of basis of management and sociology |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The course aims to improve the effectiveness of personal leadership as well as the teamwork. Refers team building process and selection of participants, development and management teams. Helps to improve leadership skills, such as eg. communication, presentation and teamwork.<br>Thanks to the interactive form - exercises, games and case studies - participants have the opportunity to gain not only knowledge but the practical leadership skills. The workshop part of the course covers following topics:<br>● training leadership skills (selection, motivation, evaluation)<br>● group dynamics and team building - team development, the roles in the team, delegating tasks, planning their own work and subordinates,<br>● effective communication in the group (conducting assessment interviews and giving feedback, communication, conducting meetings and presentations)<br>● effective negotiation - tactics of negotiation techniques, determination of own negotiating style.<br>The course provides basic knowledge and aims to develop leadership skills, that may be used in leading teams in any kind of organization, also in game industry. |
| **list/enumeration of themes/topics that should be mastered during the course** | Introduction to cross cultural leadership<br>Leadership in XXI Century<br>Leadership vs. Management<br>Leadership Styles<br>The core of leadership Systemic Leadership<br>The Instruments of Leadership Communication and |

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| | Presentation<br>● Feedback<br>● Staffing<br>● Performance improvement<br>● Leadership as reasoning<br>● Decision Making process<br>Developing Teams<br>● Building a team (Belbin)<br>● Phases of Team Development<br>Value-Based Leadership<br>● Ethical and responsible leadership<br>● Counterproductive work behaviors |
| **Competences/Learning objectives** (max. 1.500 characters) | Student is able to organize and complete his or her tasks by developing his self –effectiveness (time management, presentation skills, delegating etc.)<br>Student improves their ability to cooperate in a diverse team, sensitivity to diversity, communication skills as well negotiation skills<br>Student knows how to design and implement effective systems and procedures of Human Resource Management that will help to achieve specific goals<br>Student has the knowledge and understands the necessity of self-development in effective leadership<br>Student has the knowledge and understands group dynamics and team building process - Team Development Model of Tuckman<br>Student knows and understands the process of managing diversity in a team<br>Student improves their ability to cooperate in a diverse team, sensitivity to diversity, communication skills as well negotiation skills |
| **Outcomes** (max. 1.500 characters) | Student is able to:<br>1. Set up rules for teamwork<br>2. Understand group processes and decision making processes in organizations<br>3. Motivate members of the team<br>4. Design and implement motivational systems for a team<br>5. Evaluate HRM systems and procedures when planning, organizing and assessing teamwork<br>6. Use different strategies of negotiations |
| **Assignments** (example if available) | Project on managing a team<br>Leadership challenges – case study design<br>Problems in teamwork – case study design |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Execution of exercises, Project Work, Completing Activity during classes, Involvement in teamwork, Case study |

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| **References** (max. 3 that are key for the programme/project) | Ancona, G. Deborah, and David F. Caldwell. "Bridging the Boundary: External Activity and Performance in Organizational Teams." Administrative Science Quarterly 37, no. 4 (1992): 634-661.<br>Mathias R.L., Jackson J.H., Human Resources Management, West Publishing Company, USA, . 1997<br>Milkovich G, Newman J., Gerhart B., Compensation, 11th edition, 2013, Mcgraw Hill , USA<br>Fisher, Roger, W. William Ury, and Bruce Patton. Getting to Yes. 2nd ed. New York, NY: Penguin, 1991.<br>Robert L. Mathis& John H. Jackson, Human Resource Management, West Publishing Company, San Francisco, 1997<br>Gordon F. Shea, Mentoring, Crisp Publications, Ca, 2002<br>Marianne Minor, Coaching and Counseling, Crisp Publications, Ca, 2002<br>Covey S., The seven habits of highly effective people, Powerful lessons in personal change, Simon&Schuster, USA<br>Steve Mandel, Effective presentation skills, Crisp Publications, Ca, 1993<br>Robert B. Maddoux, Successful Negotiations, Crisp Publications, Ca, 1988<br>Daniel F. Pinnow, Leadership -What Really Matters. A Handbook on Systemic Leadership. Springer 2011 |
| **Hardware and software required** | Not specified |
| **Webpage** | http://syllabuskrk.agh.edu.pl/2015-2016/en/magnesite/study_plans/stacjonarne-zarzadzanie-international-management/module/zzp-2-202-im-s-leadership-team-management |

# Annex 8

**Name of provider / GameHub partner institution / country:**

| | |
|---|---|
| **Title** | Marketing |
| **Institution / Department** | AGH University of Science and Technology, Krakow, Poland |
| **Lecturer** | Mirski Andrzej, Ph.D. |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Participation in lectures 30h<br>Participation in seminar classes 15h<br>Realization of independently performed tasks 40h<br>Preparation of a report, presentation, written work, etc. 40h |
| **ECTS** | 5 |
| **Level** | not specified |
| **Prerequisite(s)** | Students in this class are expected to abide by the honor code approved both by the students and by the faculty of University of Science and Technology AGH. When doing your written graded assignments for this class, you are not permitted to copy material from assignments done by students who have taken this class in the past (this would be plagiarism) or any other published resource. Individual assignments are to be done individually, without collaborating with other students. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Marketing - because of its specificity - is a key issue in the entrepreneurship process. In game industry advertising is based on careful targeting and planning global marketing strategy. In this sector marketing is usually based on non-traditional forms and channels of advertising. |
| **list/enumeration of themes/topics that should be mastered during the course** | The essence of marketing. Marketing Mix<br>Customer Needs<br>Segmentation and target groups<br>Market Research Marketing<br>Product<br>Promotion<br>Public relations<br>Brand<br>The visual identity, typography<br>Advertising<br>The Psychology of Advertising and Marketing<br>Marketing Strategy<br>International Marketing<br>Quality Management<br>Examples of quality management systems: TQM and Kaizen<br>Buyer motivation<br>Consumer Behavior<br>Marketing research |

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| | Sales management<br>Advertising management<br>Psychology of marketing<br>Strategic brand management<br>Marketing and Management of Culture<br>Social media marketing<br>Creating a business presence on FaceBook/Twitter/LinkedIn/YouTube/ a Blog<br>E-Marketing<br>Principles and Techniques of Print and Non-Traditional Advertising<br>Principles and Techniques of Broadcast Advertising<br>Psychology of Advertising<br>Ethics of Advertising |
| **Competences/Learning objectives** (max. 1.500 characters) | Training active marketing skills.<br>Familiarization with methods of traditional and non-traditional advertising.<br>Mastering tools for IT building and managing marketing strategy. |
| **Outcomes** (max. 1.500 characters) | After completing the course students:<br>● Assess market opportunities by analyzing customers, competitors, collaborators, context, and the strengths and weaknesses of a company.<br>● Develop effective marketing strategies to achieve organizational objectives.<br>● Understand creative principles and marketing strategy through interactive lectures, tutorials and seminars.<br>● Know how to deal with administrative, financial and logistical challenges associated with marketing in an international context. |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Active class participation. Case Analysis Written Report. Independent Research Project. Final Exam |
| **References** (max. 3 that are key for the programme/project) | Lovelock, C.H.: Marketing challenges: cases and exercises, McGraw-Hill Book Company, New York.<br>Buell, V.P.: Marketing management, a strategic planning approach, McGraw-Hill Book Company, New York.<br>Terpstra, V., Sarathy, R.: International marketing, The Dryden Press International Edition, Chicago.<br>Hutt, M.D., Speh, T.W.: Business marketing management, The Dryden Press International Edition, Chicago.<br>The Journal of the Academy of Marketing Science (JAMS)<br>International Journal of Research in Marketing |
| **Hardware and software required** | not specified |

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| **Webpage** | http://syllabuskrk.agh.edu.pl/2015-2016/en/magnesite/modules/32631 |

# Annex 9

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Mobile systems |
| **Institution / Department** | AGH University of Science and Technology, Krakow, Poland |
| **Lecturer** | Siwik Leszek Ph.D. |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Realization of independently performed tasks 32h<br>Participation in lectures 14h<br>Participation in laboratory classes 14h<br>Preparation for classes 40h |
| **ECTS** | 4 |
| **Level** | not specified |
| **Prerequisite(s)** | Java knowledge, C# knowledge, familiarity with relational databases |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The course concentrates on selected DBMS dedicated for mobile devices and fundamentals of geolocalization and spatial data on mobile devices. A student gets familiarised with 3 mobile systems iOS, WindowsPhone and Android. The course develops programming skills needed for app development and environment. This course is crucial for game industry, since majority of products in this sector is developed to be used on mobile devices. |
| **list/enumeration of themes/topics that should be mastered during the course** | ● SQLite/SQL CE/SQL Anywhere – architecture, API, advantages, shortcommings, comparision with "enterprise" DBMS<br>● WindowsPhone environment – the architecture, main components, layers, tools and APIs (IsolatedStorage, SQL CE – API, LINQ, Delegates, lambda expressions, anonymous types, DataContext, Vici CoolStorage, C# SQlite for WP<br>● Rules and technologies of data synchronization on WindowsPhone devices<br>● Introduction to MS Sync Framework, synchronization providers, MS Sync Framework Metadata Storage Service, Offline synchronization scenarios, Peer-to-peer synchronization<br>● Android – history, architecture, application architecture, application live-cycle, activity live-cycle,, service, contentprovider, broadcast receiver, intent,<br>● Storing data in android apps, sharedpreferences, internal memory, external memory, sqlite integration, providind data via contentproviders, selected android ORMs |

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| | ● Fundamentals of geolocalization and spatial data on mobile devices<br>● Introduction to spatial data, geo APIs, developing apps with geolocalization and spatial data<br>● iOS the architecture and ecosystem, MVC pattern, events, controler, controler live-cycle, memory management – MRC/ARC, Objective-C – classes, methods, objects, anonymous objects, properties, protocols (adaptations, informal),categories, fast enumeration, blocks, development tools<br>● WindowsPhone app development: HelloWorld app, page navigation, device orientation, project resources, simple form, panorama view, complex form. Executing external tasks, web browser control, bing maps integration, isolatedstorage and files<br>● Android app development: Hello World app, Layouts, simple activity, activity navigation, simple form, Intents. ActionBar fundamentals, Fragments – building dynamic UI. Data persistence – part one – sharedpreferences, internal memory, external memory. Data persistence – part two – sqlite api, content providers, binding data to UI elements. Developing apps with user info and (geo)location, multimedia, graphics and animations |
| **Competences/Learning objectives** (max. 1.500 characters) | Familiarization with fundamentals of geolocalization and spatial data on mobile devices.<br>Mastering programming skills needed for app development and environment on iOS, WindowsPhone and iOS. |
| **Outcomes** (max. 1.500 characters) | Student understands and knows different techniques and technologies of developing apps for mobile devices with special attention paid to processing data on mobile devices.<br>Student is able to :<br>● apply development tools and techniques appropriate for WindowsPhone platform<br>● apply development tools and techniques appropriate for Android devices<br>● develop apps for android platform<br>● develop apps for WindowsPhone platform |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | 1.It is required to have a positive grade from both lab and exam.<br>2. Final grade is calculated as arithmetical average from exam and lab grades according to the following rule:<br>if avg>4.75 then FG:=5.0 else<br>if avg>4.25 then FG:=4.5 else<br>if avg>3.75 then FG:=4.0 else<br>if avg>3.25 then FG:=3.5 else<br>if avg > 2.85 then FG:=3.0 else FG:=2 |

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| **References** (max. 3 that are key for the programme/project) | 1 V.Kumar, Mobile Database Systems,Villey, 2006<br>2. Andy Wigley; Daniel Moth; Peter Foot, Mobile Development Handbook, 2007<br>3. Valentino Lee; Heather Schneider; Robbie Schell, Mobile Applications: Architecture, Design, and Development,2004<br>4. A.Silberschatz, H.F. Korth, S. Sudarshan,""Database System Concepts"", McGrow Hill, 2006.<br>5 R.Singh, J. Kanjilal, „Pro Sync framework", Apress, 2009<br>6 B.Carter Sql Anywhere Studio, Developer's guide, Wordware publishing, 2004<br>7 G.Allen, M.Owners, The definitive guide to SQLite, 2nd edition, Apress, 2010<br>8 Ch. Petzold, Programming windows phone, Microsoft press, 2010<br>9 J.Liberty, J. Blankenburg, Migrating to Windows Phone, Apress 2012<br>10 M. Sanchez, A.Swift Mastering CoreData, Apple materials<br>11 http://www.stanford.edu/class/cs193p/cgi-bin/drupal/ – iOS development resources<br>12 http://developer.android.com/index.html |
| **Hardware and software required** | not specified |
| **Webpage** | http://syllabuskrk.agh.edu.pl/2015-2016/en/magnesite/modules/31101 |

# Annex 10

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Usability Engineering |
| **Institution / Department** | Management |
| **Lecturer** | N/A |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Participation in lectures 30 h<br>Participation in laboratory classes 30 h<br>Preparation of a report, presentation, written work, etc. 15 h<br>Completion of a project 15 h |
| **ECTS** | 3 |
| **Level** | First-cycle study |
| **Prerequisite(s)** | none |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Usability is a key area in modern engineering design. It is about designing systems and artifacts that are easy to use. It considers perceptual and cognitive abilities of the users, their biases and habits, environmental and contextual factors, cultural and social norms, and so on, to design a product that can be used naturally without having to think about it. It studies various factors that affect user interaction — whether a website, software application, mobile device, robotic system, or any other user-operated product — and how to incorporate them in the design from the very beginning.<br><br>This course is designed to give an overview of various methodologies for user-centered design with focus on cognitive science and techniques for conducting usability testing (evaluation techniques). The course will give students an overall understanding of the field and would make them realize that usability is not a luxury but a fundamental requirement of any interactive software or any other interface. They will also acquire some hands-on experience with usability testing and evaluation. |
| **list/enumeration of themes/topics that should be mastered during the course** | The course will be based on lectures, reading research papers, discussions, dealing with practical design problems and doing small projects.<br><br>There will be laboratory work evaluating and comparing usability of various kinds of systems. Though we will focus largely on software systems, we will also consider usability of other artifacts and systems as well. |
| **Competences/Learning objectives** | Problem-solving and designing in a group, and teamwork. Designing and conducting usability studies: Designing |

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| (max. 1.500 characters) | surveys, performing user testing, making user-centerer design. Interaction design of user-centered systems and interfaces. How studies of cognitive science helps in designing user-friendly systems and interfaces. Principles of Interaction Design. |
| **Outcomes** (max. 1.500 characters) | Project |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Class participation: 20%<br>Class presentations: 20%<br>Weekly tasks: 20%<br>Term Project (mandatory): 40% |
| **References** (max. 3 that are key for the programme/project) | C. Barnum (2002). Usability testing and research. Longman.<br>Steve Krug (2005). Don't make me think: A commonsense approach to web usability. 2nd ed.<br>Deborah J. Mayhew (1999). The usability engineering life cycle. San Francisco: Morgan Kaufman.<br>Jakob Nielsen (1993). Usability engineering. Academic Press.<br>Donald A. Norman (1990). The design of everyday things. Doubleday.<br>Donald A. Norman(2004). Emotional Design.<br>Henry Petroski (2008). Success through failure.<br>Henry Petroski (1994). The evolution of useful things.<br>K. Vredenburg, S. Isensee & C. Righi (2002). User-centered design: An integrated approach. Printice hall. |
| **Hardware and software required** | N/A |
| **Webpage** | |

# Annex 11

**Name of provider / GameHub partner institution / country:** AGH University of Science and Technology, Krakow, Poland

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|---|---|
| **Title** | Web application technologies |
| **Institution / Department** | AGH University of Science and Technology, Krakow, Poland<br>Faculty of MAnagement |
| **Lecturer** | Konieczny Marek M.Sc. Eng. |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Examination or Final test 10 h<br>Participation in lectures 14 h<br>Participation in laboratory classes 14 h<br>Completion of a project 40 h<br>Realization of independently performed tasks 22 h |
| **ECTS** | 4 |
| **Level** | not specified |
| **Prerequisite(s)** | The course has following requirements:<br>- knowledge of Java programming language<br>- basic knowledge of operating systems<br>- basic knowledge of computer networks |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The course concentrates on following issues:<br>● Introduction, history and taxonomy of web-based systems.<br>● Representational State Transfer REST<br>● Web Services<br>● Spring Core and Spring Web<br>● Advanced Dependency Injection Frameworks<br>● Writing Testable Code<br>● Java Enterprise Edition<br>● RESTful services<br>● Web Services<br>● Spring Core<br>● Spring MVC<br>During the course a student acquires knowledge on designing, prototyping, validation and utilization of web application. Due to the fact that majority of games are available on Internet, this course is an essential one for a person who wants to work in the game sector. |
| **list/enumeration of themes/topics that should be mastered during the course** | ● Introduction to web-based systems, basic network protocols, brief historical background.<br>● Taxonomy of web-based systems, from CGI to Spring.<br>● Representational State Transfer REST<br>● Introduction to Representational State Transfer REST architecture.<br>● Different methods of describing and using resources.<br>● Designing REST applications. |

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| | ● Introduction to SOAP: base technologies XML, WSDL.<br>● Defining the SOAP-based service.<br>● Different architectural styles of constructing SOAP-based services.<br>● Introduction to Spring Framework.<br>● Inversion of Control and Dependency Injection.<br>● Aspect-Oriented programming.<br>● Spring Model-View-Controller approach.<br>● Introduction to other DI frameworks.<br>● Google Guide.<br>● How to write testable code.<br>● Introduction to J2EE technologies.<br>● Most common design patterns used in enterprise systems.<br>● RESTful services<br>● Basics of JAX-RS (Oracle), using Jersey – implementation of JAX-RS, various Eclipse IDE Tools, Basics of JAXB (Oracle).<br>● Creating SOAP-based web services , comparison of JAX-RPC and JAX-WS,different styles of WSDL, using Eclipse IDE, service inspections using SoapUI.<br>● Spring basics, creating Spring beans in different scopes, various ways of creating beans, software testing in Spring.<br>● Spring MVC architecture, creating a simple web app, integration with various services. |
| **Competences/Learning objectives** (max. 1.500 characters) | Training of creating thinking and teamwork.<br>Mastering modern programming languages and using them in developing web applications. |
| **Outcomes** (max. 1.500 characters) | Student:<br>● Can think and act in a creative manner, can cooperate with teammates during project work.<br>● Can create web applications using modern languages and frameworks.<br>● Can create, configure and use services available through different technologies.<br>● Can use various techniques and frameworks as a part of web-based application development process.<br>● Knows and understands modern technologies, patterns and programming languages used in enterprise systems.<br>● Knows and understands fundamental rules of software testing. |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, | The final grade will be based on the following schema:<br>exam – 40%<br>lab activities – 30% |

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| …) | project – 30% |
| **References** (max. 3 that are key for the programme/project) | Dominique Jullier, Marek Konieczny, Sławomir Zieliński; Applying software-defined networking paradigm to tenant perspective optimization of cloud services utilization, Computer Networks 2015. |
| **Hardware and software required** | not specified |
| **Webpage** | http://syllabuskrk.agh.edu.pl/2015-2016/en/magnesite/modules/32633 |

# Annex 12

**Name of provider / GameHub partner institution / country: AGH University of Science and Technology / Poland**

Here we present other courses from our University which are taught in Polish, but in our opinion they may be also interesting in building GameHub Modules. Due to fact that there are no syllabi in English we deliver only names of modules and short descriptions.

**First two courses are taught in the Faculty of Humanities and the syllabi are directly copied from MIT OCS. Below we provide short description of courses:**

**# Interface design**

introduces the principles of user interface development, focusing on the following areas:
## Design
We will look at how to design good user interfaces, covering important design principles (learnability, visibility, error prevention, efficiency, and graphic design) and the human capabilities that motivate them (including perception, motor skills, color vision, attention, and human error).
## Implementation
We will see techniques for building user interfaces, including low-fidelity prototypes, Wizard of Oz, and other prototyping tools; input models, output models, model-view-controller, layout, constraints, and toolkits.
## Evaluation
We will learn techniques for evaluating and measuring interface usability, including heuristic evaluation, predictive evaluation, and user testing.
## Research
We will learn how to conduct empirical research involving novel user interfaces (graduate level only).

**# Design thinking**

Learn to produce great designs, be a more effective engineer, and communicate with high emotional and intellectual impact. This project based course gives students the ability to understand, contextualize, and analyze engineering designs and systems. By learning and applying design thinking, students will more effectively solve problems in any domain. Lectures focus on teaching a tested, iterative design process as well as techniques to sharpen creative analysis. Guest lectures from all disciplines illustrate different approaches to design thinking. This course develops students' skills to conceive, organize, lead, implement, and evaluate successful projects in any engineering discipline. Additionally, students learn how to give compelling in-person presentations. Open to all majors, all years.

**Next courses which descriptions we provide below are connected with law area and technology**

**#Patents, Copyrights and law of intellectual property**

This subject is an intensive introduction to the law of intellectual property, with major emphasis on Polish patent law. The course also focuses on copyrights, provides a brief look at trademarks and trade secrets, presents comparisons of what can and cannot be

protected, and what rights the owner does and does not obtain. Issues relating to information technology and business methods are highlighted.

**#Security in e-business**
Security in Electronic-Business is a graduate course on the design and implementation of information security in e‑business systems. E-business systems include both business to business systems and business to consumer systems – more frequently classed as e-commerce. In this course are also many information related to polish law of information security.

**Next three course are broadly connected with Game Industry, but they may be helpful for developing skills that are necessary for people who build their innovative IT enterprises.**

**#Creative Thinking**
Critical thinking and creative thinking are skills that are valued in every company, organization and every aspect of our daily life. Student will practice creative thinking techniques in addition to brainstorming that will help him LEARN to think creatively; and apply these skills to a work environment. Throughout this course, student will also have opportunity to develop critical thinking and reasoning skills to help analyze and respond appropriately to a wide variety of personal and work situations.

**#Marketplace simulation**
The only activity that students perform in this course is to form teams and play on-line the Marketplace Business Simulation. Students start a new company or a marketing division that enters the microcomputer business. They serve as the company's or division's executive team. They analyze market research data, form an overall business strategy and then make a set of strategic and tactical decisions with the goal to become profitable and to be the best competitor in the industry. The market they serve is competitive and fast-paced, the customers are demanding and the competition is working hard to increase their market share. What differs in each business simulation is the level of detail and decision complexity in the various functional areas of business - a teacher sets up the level according to the needs and competence level of the students. Game is provided by Innovative Learning Solutions: http://www.marketplace-simulation.com/

**#Internet marketing**
This course provides an introduction to digital marketing. The course covers all major digital platforms such as mobile, social media and search (paid and organic).

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# Annex 13

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Interaction and Multimedia |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Mariluz Guenaga |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Teaching and learning strategies include:<br>Lectures.<br>Document reading (paper documents, web pages, interactive applications).<br>Video projections.<br>Guided information searches.<br>Individual and group activities.<br><br>Activities:<br>In the classroom (60 hours):<br>Attention and active participation in lectures, and responsible execution of all learning activities proposed by the teacher.<br><br>Outside the classroom (90 hours):<br>Individual study of the contents of the lectures<br>Finishing all practical activities and keeping and "Activity Book" containing the results of all tasks carried out by the student<br>during the semester.<br>The course implies 150 work hours for an average student. |
| **ECTS** | 6 |
| **Level** | 3rd course of a double degree (Business Management + Computer Engineering) |
| **Prerequisite(s)** | Basic programming concepts. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The subject works on human-computer interaction and also in multimedia (image, sound, video). Both are relevant elements of game design. In the HCI part of the subject we work issues related to the user and also about technology. |
| **list/enumeration of themes/topics that should be mastered during the course** | - Human Computer Interaction:<br>Importance of human computer interaction and areas included in the field. History of human computer interaction. Information processing in humans. Characteristics and properties of interaction controls.<br>- Interactive systems:<br>The dialogue between people and computers: types and characteristics. Interaction paradigms. User interface design. Accessibility.<br>-Multimedia applications: |

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| | Introduction to multimedia systems. The importance of digital formats. Digitizing and quantizing. Graphic design elements.<br>- Description of digital media:<br>Text. Graphics. Sound. Animation. Video. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | GENERIC COMPETENCE CG8.2. Time Management: distribute time in a logical way, considering personal aims in the<br>short, medium and long term, and personal and professional areas to be developed. Level 2: Define and set objectives in order, planning individual activities in the medium and long term (from several weeks to six months).<br><br>SPECIFIC COMPETENCE SC1. Describe the terminology, theoretical models and design principles of user interfaces and<br>apply them to the development of interactive computer programs.<br><br>SPECIFIC COMPETENCE SC2. Analyze the main characteristics of different digital media and develop simple multimedia<br>programs incorporating both discrete and continuous media. |
| **Outcomes**<br>(max. 1.500 characters) | |
| **Assignments**<br>(example if available) | - Evaluate a web page according to J. Nielsen heuristics, improve it<br>- Develop a prototype of the new web page with Prototyper<br>- Perform a usability test of the previous development with your peers<br>- Create a multimedia composition editing an image and including an audio composition. |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | Evaluation techniques<br>Periodic evaluation of the "Activity Book", where all work done during the course is kept.<br>Evaluation through written exams dealing with concepts and their application.<br>Grading system<br>50% of the final grade comes from the evaluation of the "Activity Book", measuring the degree of acquisition of practical<br>aspects of competences SC1 and SC2 (40%) and generic competence CG8.2 (10%).<br>The other 50% of the final grade comes from written exams measuring the degree of acquisition of theoretical aspects of competences SC1 and SC2. |

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| **References** (max. 3 that are key for the programme/project) | PREECE J. ET AL, 2015 Interaction Design. Wiley & Sons.<br>SHNEIDERMAN B. ET AL, 2014. Designing the user interface. Pearson Addison Wesley.<br>CHAPMAN AND CHAPMAN, 2009. Digital Multimedia. John Wiley & Sons. |
| **Hardware and software required** | Prototyper<br>Audacity<br>Gimp |
| **Webpage** | |

# Annex 14

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Entrepeneurship and Business Models |
| **Institution / Department** | Management/Banking and Insurance Management |
| **Lecturer** | DI. Mag. Dr. Hans Aubauer |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated Lecture |
| **ECTS** | 3 |
| **Level** | 2. Semester (Master) |
| **Prerequisite(s)** | Module FKO (4) |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | This course offers an introduction to leadership within corporations, and business models. Methods to evaluate existing business models are discussed, as well as structured approaches to business innovation. Case studies illustrate methods of finding innovative soltion and the design of business plans. |
| **list/enumeration of themes/topics that should be mastered during the course** | The core contents of this course include: [1] Methods of strategic management: definition of visions, missions and goals, SWOT analysis etc. [2] Analysis of demand/supply, business environment and trends; [3] Entrepreneurship as a process: idea generation, evaluation, implementation; [4] Creative generation and evaluation of ideas; methods of structuring and evaluating ideas in the business context; [5] Innovation management in corporations; [6] Design and evaluation of business plans; [7] Diversified businesses: evaluation of pros/cons and synergies; Optional contents can contain: [8] Opportunities of and limits to corporate growth; [9] Innovation in marketing: consumer segmentation, positioning, selection of marketing-mix, etc. |
| **Competences/Learning objectives** (max. 1.500 | |

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| characters) | |
| **Outcomes** (max. 1.500 characters) | The professional and targeted development of strategies and their implementation are a main driver of a venture's success. Successful participants in this module are able to apply methods of evaluating, reflecting on and innovating business models. Additionally students are prepared to control various stages of innovation processes while managing internal and external communication and reacting to arising conflicts. Post completion of this module, students have acquire strategic competence which they can apply in their professional practice. They are able to critically reflect on established processes, monitor target achievement and fulfil strategic controlling tasks. |
| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Final exam, assessment of active course participation |
| **References** (max. 3 that are key for the programme/ project) | Brost et al (2012): Corporate Banking: Zukunftsorientierte Strategien im Firmenkundengeschäft, Frankfurt School V. Doppler/Lauterburg (2008): Change Management - Den Unternehmenswandel gestalten, Campus. Fueglistaller (2012): Entrepreneurship, Modelle - Umsetzung - Perspektiven, Springer. Harvard Business Review (2011): HBR's 10 Must Reads on Change Management. Lauer (2010): Change Management, Grundlagen und Erfolgsfaktoren, Springer. Osterwalder et al (2011): Business Model Generation, Campus. Academic journals: Harvard Business Review |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_management/bvm/Studium/~cqqp/bvm_LVDetails/?alvid=4356390499&lan=en |

# Annex 15

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Informatics 1 for Students of Information Management |
| **Institution / Department** | Information Management |
| **Lecturer** | Ing. AVENDER Andreas |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components |
| **ECTS** | 4 |
| **Level** | 1. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | This Course gives an overview about computer science. In addition to important technical terms, some basic concepts of computer systems are shown. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | The following topics are discussed during the lectures:<br>• Definition of terms (computer science, algorithm, program, message, information message)<br>• analog-, digital- and binary data representation<br>• codes (ASCII, ANSI, UNICODE, etc.)<br>• number systems<br>• representation of numbers (external, BCD, binary, fixed point, floating-point)<br>• multimedia data (signal types, digitalization, audio signal, audio file formats, image- and grafic file formats), the XML family of technologies<br>• propositional logic, digital logic<br>• computer organization, digital technology<br>• computer architecture, principle and function of micro processors<br><br>The following topics are discussed during the practical training: |

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| | • simulation of digital logic circuits<br>• programming languages (interpreter, compiler, linker, programming languages overview )<br>• fundamental terms of software developement (During the practical training different diagram types - flow chart, nassi-shneiderman chart, pseudo code- are used to develop algorithms).<br>• XML, XSL, XML-Schema |
| **Outcomes**<br>(max. 1.500 characters) | |
| **Assignments**<br>(example if available) | written examination<br>(XML-Part: written exam + continuous assessment) |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | |
| **References**<br>(max. 3 that are key for the programme/project) | Script (PowerPoint slides) and commented summary of the examples, developed during the practical training |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot-Uebersicht/department-angewandte-informatik/ima/Studium/~uqs/IMA-lvdetails/?alvid=4352549676&lan=en |

# Annex 16

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | User Expirience Design 1 |
| **Institution / Department** | Communication, media, Sound and Interaction Design |
| **Lecturer** | FH-Prof. DI Dr. BAUMANN Konrad |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 3 |
| **Level** | 2. semester |
| **Prerequisite(s)** | |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Analysis methods, aspects of user experiences in the interaction with a product, a service, an environment or an institution |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Skills in interaction and interface design of interactive media as well as in the field of advanced technologies (touchless interfaces, media spaces, sensory environments) |

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| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation /Grading basis/Form of control** (exams, project work, …) | immanent examination character |
| **References** (max. 3 that are key for the programme/ project) | Books: Steven Poole, Trigger Happy Programming Interactivity: A Designer's Guide to Processing, Arduino, and OpenFrameworks Massimo Banzi, Getting Started with Arduino Cooper, Reimann Cronin: About Face: Interface und Interaction Design Interaction Design Beyond HumanComputer Interaction Journals: ACM: interactions, Reality |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/cmi/CMI_Studium/~ctca/cmi_lvdetails/?alvid=4358065689&lan=en |

# Annex 17

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | User Interface Design |
| **Institution / Department** | Information design |
| **Lecturer** | FH-Prof. DI Dr. BAUMANN Konrad |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 2 |
| **Level** | 4. Semester |
| **Prerequisite(s)** | |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | User interface patterns and standards; information architecture; display and visualisation of information; transition from user interface to service design, digital prototypes |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Basics, Skills, Project handling, Implementation, Realisation |
| **Outcomes** (max. 1.500 characters) | |

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| **Assignments** (example if available) | Assignments, active participation in class, presentation and documentation of the semester project |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | |
| **References** (max. 3 that are key for the programme/ project) | Books: Bill Moggridge, Designing Interactions, Cambridge 2007; Lucy Bullivant, Responsive Environments: Architecture, Art and Design, London 2006; Cooper, Reimann Cronin: About Face: Interface und Interaction Design Interaction Design Beyond HumanComputer Interaction, 2007; Leopoldseder, Ars Electronica, Hatje Cantz Verlag; Dawes, Analog In, Analog Out, New Riders 2007; Zeldman, Designing with Web Standards, New Riders, 2009; Tufte, Envisioning Information, Graphics Press, 1990; Marcotte, Responsive Web Design, A Book Apart, 2011; Journals: ACM: interactions, Reality; IEEE Proceedings; Weave; Digital Production; Production Partner; |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4353758481&lan=en |

# Annex 18

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | User-centred Design |
| **Institution / Department** | Information design |
| **Lecturer** | FH-Prof. DI Dr. BAUMANN Konrad |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 2 |
| **Level** | 2. Semester |
| **Prerequisite(s)** | |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | User-centred design process models,; methods to analyse the users' requirements such as contextual interviews, focus groups, diary studies and task analysis, creation of personas, scenarios and storyboards; paper prototypes and iterative design; methods are tried out according to real-world tasks set |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Basics of Programming for designers as well as of 3D and User-centred Design |
| **Outcomes** (max. 1.500 characters) | |

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| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Written assignments, active participation in class, presentation and documentation of a final project |
| **References** (max. 3 that are key for the programme/ project) | Jeremy Birn, Digital Lighting and Rendering, 3. Auflage 2013; Alan Cooper (2004) The Inmates Are Running the Asylum: Why High-tech Products Drive Us Crazy and How to Restore the Sanity; Kim Goodwin (2009) Designing for the Digital Age: How to Create Human-Centered Products and Services. Journals, Websites: Association for Computing Machinery, ACM www.acm.org ACM SIGCHI, Special Interest Group in Human-Computer Interaction http://www.sigchi.org/ |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4353758174&lan=en |

# Annex 19

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Usability Testing |
| **Institution / Department** | Information Design |
| **Lecturer** | FH-Prof. DI Dr. BAUMANN Konrad |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 2 |
| **Level** | 1. semester |
| **Prerequisite(s)** | |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | First introduction into user-centred design and usability; sensitisation and motivation for this topic, usability testing of websites using the Thinking-Aloud-Method |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | The students should have developed an understanding for the importance and the methods of usability testing. They should be able to carry out a project using the thinking aloud method by themselves. |
| **Outcomes** (max. 1.500 | |

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| characters) | |
| **Assignments** (example if available) | Seminar, excercises in class, homework, group work, practical project |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Assignments, active participation in class, presentation and documentation of a final project |
| **References** (max. 3 that are key for the programme/ project) | Steve Krug (2009): Rocket Surgery Made Easy: The Do-it-yourself Guide to Finding and Fixing Usability Problems. Steve Krug (2014): Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability. |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4352575612&lan=en |

# Annex 20

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | International Market Entry Strategies |
| **Institution / Department** | International Management |
| **Lecturer** | Bernadette Frech |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated Lecture<br>30 units of lecture à 50 min with groups of 30 students<br>Combination of lectures, case-studies, academic article reading, group work and company guest lectures |
| **ECTS** | 3 |
| **Level** | Bachelor |
| **Prerequisite(s)** | International Business (Principles of International Business Lecture) |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The Game Industry is an international business. Some SMEs within the game industry might consider internationalization as a growth option. There are different motivations for SMEs to internationalize, such as economies of scale, diversifying markets and thereby minimizing risks, or high demand in other markets. This course should guide SMEs to decide whether their company is ready for internationalization, with which products/solutions/services they could internationalize, which markets would be attractive, how to enter a foreign market and how to bring the product/solution/service to the market. |
| **list/enumeration of themes/topics that should be mastered during the course** | Theories of International Market Entry<br>Systematic Framework if International Market Entry<br>Corporate Readiness<br>Product Readiness<br>Target Market Selection<br>Entry Mode Choice<br>Market Entry |
| **Competences/Learning objectives** (max. 1.500 characters) | ... in terms of knowledge<br><br>1. Exploring important market entry modes<br>2. Explain the pros and cons of the different modes to enter a foreign market<br>3. Develop a systematic approach for a market research & analysis<br>4. Identify and analyze factors that influence a firm's choice of entry mode by assessing global market opportunities<br>5. Give a recommendation on an entry mode based on your |

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| | research results<br><br>...in terms of skills and competences<br><br>1. Ability to work in teams<br>2. Capability to understand & apply the different strategic concepts<br>3. Critical thinking<br>4. Research skills<br>5. Knowledge exchange with experts |
| **Outcomes**<br>(max. 1.500 characters) | Knowledge on theories of international market entry<br>Practical application of knowledge based on case studies and company interactions |
| **Assignments**<br>(example if available) | Research Report<br>Research Presentation |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | Exam (Individual Work) 60%<br>Research Report and Presentation (Group Work) 40%<br>Both must have a passing grade to succeed in the course |
| **References**<br>(max. 3 that are key for the programme/project) | Hill (2014): International Business, McGraw Hill<br>Doole & Lowe (2008) International Marketing Strategy: Analysis, Development and Implementation, Cengage Learning<br>Albaum & Duerr (2008). Internatinal Marketing and Export Management, 6th ed., Prentice Hall |
| **Hardware and software required** | No specific requirements |
| **Webpage** | www.fh-joanneum.at<br>No webpage for the course itself (Moodle lecture) |

# Annex 21

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | App Design 1 |
| **Institution / Department** | Communication, Media, Sound and Interaction Design |
| **Lecturer** | DI (FH) FABRY Daniel |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 3 |
| **Level** | 2. Semester |
| **Prerequisite(s)** | Dependent on the respective course |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Design focused application development for browsers |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Skills in interaction and interface design of interactive media as well as in the field of advanced technologies (touchless interfaces, media spaces, sensory environments) |

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| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation /Grading basis/Form of control** (exams, project work, …) | immanent examination character |
| **References** (max. 3 that are key for the programme/ project) | Books: Steven Poole, Trigger Happy Programming Interactivity: A Designer's Guide to Processing, Arduino, and OpenFrameworks Massimo Banzi, Getting Started with Arduino Cooper, Reimann Cronin: About Face: Interface und Interaction Design Interaction Design Beyond HumanComputer Interaction Journals: ACM: interactions, Reality |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/cmi/CMI_Studium/~ctca/cmi_lvdetails/?alvid=4358065221&lan=en |

# Annex 22

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Interaction Design |
| **Institution / Department** | Information Design |
| **Lecturer** | Severin Filek, Orhan Kipcak, Heimo Lercher, Dietmar Mosbacher, Melitta Moschik |
| **Language** | |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Project thesis |
| **ECTS** | 11 |
| **Level** | 5th semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Conception and realisation of practical projects and working on tasks set in the area of interface design, interactive media design, game design an screen design. Guest lectures and workshops by national and international designers. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 | Development, Realisation and Discussion of interactive design work |

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| characters) | |
| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Permanent assessment, final exam |
| **References** (max. 3 that are key for the programme/ project) | |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?vlvid=4339129276&lan=en |

# Annex 23

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Media Design Startups |
| **Institution / Department** | Media and Design/ Media Design Startups |
| **Lecturer** | Mag. Phil. Severin Filek, Heimo Lercher, Dietmar Mosbacher, MSc, Orhan Kipcak, FH-Prof. Mag. Melitta Moschik, Tomislav Bobinec |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | PT |
| **ECTS** | 8 |
| **Level** | 4. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Imparting of technical skills in the field of video postproduction, especially in the field of animation, of 3D design, of 3D animation, of multimedia authoring, conceptual and contextual supervision of the "real world" projects, supportive inputs concerning media economy and production methods. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 | Use and further development of design skills and technical competences when dealing with video and animation in so-called "real |

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| characters) | world" projects |
| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Final presentation, final project, permanent assessment |
| **References** (max. 3 that are key for the programme/ project) | Geschichte und Technik der Filmmontage, Karel Reisz, MÜNCHEN 1988 Geschichte des Films. Band 1-2: von Ulrich Gregor und Enno Patalas James Monaco, Film verstehen: Kunst, Technik, Sprache. Geschichte und Theorie des Films und der Medien, Reinbek bei Hamburg 10. Aufl. 2000; Knut Hickethier, Film- und Fernsehanalyse, Stuttgart 4. Aufl 2007 |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4353758366&lan=en |

# Annex 24

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Interfaces |
| **Institution / Department** | Communication, media, sound and interaction design |
| **Lecturer** | Prof. Dr. GRÜNDLER Josef |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 2 |
| **Level** | 1. semester |
| **Prerequisite(s)** | none |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Development of interaction and interface concepts, content oriented design, development of prototypical solutions. Language: English |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | cross-modular competences |

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| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation /Grading basis/Form of control** (exams, project work, …) | immanent examination character |
| **References** (max. 3 that are key for the programme/ project) | dependent on the respective topic of the excursion |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/cmi/CMI_Studium/~ctca/cmi_lvdetails/?alvid=4354943271&lan=en |

# Annex 25

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Digital Sound Processing |
| **Institution / Department** | Communication, media, sound and interaction design |
| **Lecturer** | Prof. Dr. GRÜNDLER Josef |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 4 |
| **Level** | 1. Semester |
| **Prerequisite(s)** | none |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Filter (basic typs, equalizer, time-variant filters e.g. wahwah and phasor effects), Time delays (FIR and IIR comb-filter, fractional time-delays, audio-effects e.g. vibrato), application of modulation and demodulation (pitch shifting in the frequency domain, spectral inversion), non-linear signal processing (dynamic processing, exciters), fundamentals of sound spatialization (localization and distance effects, 3D audio reproduction via headphones and loudspeakers), reverb, pitch-shifting and modification in time-domain, signal processing related to channel & phase vocoder, LPC, cepstrum, morphging, spectral signal modelling (e.g. sinusoidal models) |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Comprehensive artistic and theoretic skills in the field of time-based media, especially sounddesign |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | immanent examination character |
| **Evaluation/Grading basis/Form of control** (exams, project work, | |

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| …) | |
| **References**<br>(max. 3 that are key for the programme/project) | Books: DAFx: Digital Audio Effects, (Ed.) Zölzer U., John Wiley & Sons; Auflage: 2. Auflage (11. März 2011) , engl., ISBN-10: 0470665998, ISBN-13: 978-0470665992 Robert Jacobson (ed.), „Information Design“, Cambridge, 1999 Donald A. Norman: The Design of Everyday Things. Blog: Create Digital Music Magazines – Electronic Musician, Computer Music |
| **Hardware and software required** | |
| **Webpage** | |

# Annex 26

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Psychology of Perception |
| **Institution / Department** | Communication, media, sound and interaction design |
| **Lecturer** | Prof. Dr. GRÜNDLER Josef |
| **Language** | Englisch |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Lecture |
| **ECTS** | 1 |
| **Level** | 1. semester |
| **Prerequisite(s)** | Knowledge of IT systems, basic knowledge of graphic, video and audio software; dependent on the respective course. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Basics of the psychology of perception and the physiology of the sensory system. Language: English |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Comprehensive artistic and theoretic skills in the field of time-based media. The graduate will have acquired leadership qualities, detailed knowledge about self management, corporate management, acquisition, project management, business-friendly design processes, branding, advertising, CD and CI. The graduate will have acquired detailed knowledge about the state of the art of the international design discourse, |

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| | will be able to actively take part in newsgroups and blogs as well as in public discussions and incorporate the gained knowhow into his/her own work. The graduate is familiar with the basics of scientific work and state of the art of research in design, and s/he can apply scientific methods to his/her own master thesis. |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation /Grading basis/Form of control** (exams, project work, …) | Written Exam |
| **References** (max. 3 that are key for the programme/ project) | Books: Jeff Bellatoni, Matt Woolman: TYPE in MOTION – innovative digitale gestaltung Bob Cotton/Rich Oliver „Understanding Hypermedia“ Robert Jacobson (ed.), „Information Design“, Cambridge, 1999 Isaac Victor Kerlow – „The Art of 3-D Computer Animation and Imaging“ John Wiley & Sons, 2003; James Foley et al. – „Computer Graphics, Principles and Practice“ von Foley Addison Wesley, 2003; Alan Watt – “3D Computer Graphics” Gene Youngblood: Expanded Cinema Books: „Marketing-Management“, Philip Kotler, Friedhelm Bliemel Schäffe "Werbung ist Kunst" Michael Schirner; "Die Werbung ist ein lächelndes Aas" Oliviero Toscani; "Die Sprache des Neville Brody" Jon Wozencroft; Martin Hartmann, Rüdiger Funk, Horst Nietmann: „Präsentieren. Präsentationen: zielgerichtet und adressatenorientiert.“ Books: Laura Brendel:Design Research Höger: Design Research: Strategy Setting to Face the Future Krippendorff: The Semantic Turn Journals: Create Digital Motion, Create Digital Music, Production Partner, E-Musician, Neural |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/cmi/CMI_Studium/~ctca/cmi_lvdetails/?alvid=4354942867&lan=en |

# Annex 27

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Sound and Interaction Design |
| **Institution / Department** | Communication, media, sound and interaction design |
| **Lecturer** | Prof. Dr. GRÜNDLER Josef |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 3 |
| **Level** | 2. semester |
| **Prerequisite(s)** | none |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The proposed lecture contains topics related to Human Computer Interaction with Audio. Initially, user centred design theory and usability evaluation will be covered. Following the course will focus on the use of audio modality and the spatial dimension of audio in human computer interaction. Ways to present information through audio using speech and non-speech sounds as well as sonification will be presented. Perceptual and cognitive aspects of auditory scene analysis, perception of space and aspects of attention will be examined and their application into auditory display design will be discussed. How audio interacts with other senses such as vision and touch within the scope of user interface design will be discussed. Finally, interaction techniques will be presented and ways to implement them through contemporary technologies involving user tracking and sensing will be discussed. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competenc** | |

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| **es/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation /Grading basis/Form of control** (exams, project work, …) | immanent examination character |
| **References** (max. 3 that are key for the programme/ project) | Akustische Kommunikation: Grundlagen mit Hörbeispielen, Terhardt E., Springer; Auflage: 1998, dt., ISBN-10: 3540634088, ISBN-13: 978-3540634089 Psychoacoustics: Facts and Models, Fastl H., Zwicker E., Springer; Auflage: 3rd ed. 2007, engl., ISBN-10: 3540231595, ISBN-13: 978-3540231592 Acoustics for Engineers: Troy Lectures, Blauert J., Xiang N., Springer; Auflage: 2nd ed. 2009, engl., ISBN-10: 364203392X, ISBN-13: 978-3642033926 DAFx: Digital Audio Effects, (Ed.) Zölzer U., John Wiley & Sons; Auflage: 2. Auflage (11. März 2011) , engl., ISBN-10: 0470665998, ISBN-13: 978-0470665992 Sound-Design - Sound-Montage - Soundtrack-Komposition: Über die Gestaltung von Filmton, Lensing J.U., Schiele & Schön; Auflage: 2. (5. Mai 2009), dt., ISBN-10: 3794907930, ISBN-13: 978-3794907939 Audiodesign: Akustische Kommunikation, akustische Signale und Systeme, psychoakustische Grundlagen, Klangsynthese, Audioediting und Effektbearbeitung, Sounddesign, Bild-Ton-Beziehungen, Raffeseder, H., Carl Hanser Verlag GmbH & Co. KG; Auflage: 2., aktualisierte und erweiterte Auflage (4. Februar 2010), dt., ISBN-10: 3446417621, ISBN-13: 978-3446417625 Spatial Audio Processing: MPEG Surround and Other Applications, Breebaart J., Faller Ch., John Wiley & Sons (2. Januar 2008), engl., ISBN-10: 0470033509, ISBN-13: 978-0470033500 Interaction Design: Beyond Human-Computer Interaction, Rogers Y., Sharp H., Preece J., John Wiley & Sons; Auflage: 0003 (26. April 2011), engl., ISBN-10: 0470665769, ISBN-13: 978-0470665763. The Sonfikation Handbook, (Ed.) Hermann T., Hunt A., Neuhoff J.G., Online Buch, engl., URL: http://sonification.de/handbook/ |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_d |

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# Annex 28

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Interaction Design |
| **Institution / Department** | Media and Design/Interaction Design |
| **Lecturer** | |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | PT |
| **ECTS** | 11 |
| **Level** | 5. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Conception and realisation of practical projects and working on tasks set in the area of interface design, interactive media design, game design and screen design. Guest lectures and workshops by national and international designers. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | Development, Realisation and Discussion of interactive design work |

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| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Permanent assessment, final exam |
| **References** (max. 3 that are key for the programme/ project) | Books: Bill Moggridge, Designing Interactions, Cambridge 2007; Lucy Bullivant, Responsive Environments: Architecture, Art and Design, London 2006; Cooper, Reimann Cronin: About Face: Interface und Interaction Design Interaction Design Beyond HumanComputer Interaction, 2007; Leopoldseder, Ars Electronica, Hatje Cantz Verlag; Dawes, Analog In, Analog Out, New Riders 2007; Zeldman, Designing with Web Standards, New Riders, 2009; Tufte, Envisioning Information, Graphics Press, 1990; Marcotte, Responsive Web Design, A Book Apart, 2011; Journals: ACM: interactions, Reality; IEEE Proceedings; Weave; Digital Production; Production Partner; .net, Future Publishing; |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?vlvid=4339129276&lan=en |

# Annex 29

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

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|---|---|
| **Title** | Basics of Project Management |
| **Institution / Department** | Information Management |
| **Lecturer** | Mag. JANSER-MUNRO Gerhild, MBA |
| **Language** | Englisch |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components<br>Parts: introductory unit (1.5 units), 6 lectures two units each, 3 practics blocks three units each (practice oriented) |
| **ECTS** | 1,5 |
| **Level** | **3. Semester** |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Projects come in all shapes and sizes, but have certain features in common: defined goals, a time limit, specified resources (staff, budget, equipment, etc.) and a sponsor/customer. Also, the team members have defined roles and responsibilities. The role of the project leader is to plan and manage tasks, costs and resources of the project so that the goals are reached in the most efficient way. Projects appear as building blocks in an organisation's strategy. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | This course aims to provide you with some basic understanding of project management and help you understand the importance of (international) projects in everyday-business. You will be familiarized with the most relevant project management terms, techniques, tools and methods, as well as with the importance of team building and team culture. Alongside classical project management the course introduces you to agile project management (in specific SCRUM) and some of its methods in a dynamic environment (e.g. software development).<br><br>Out of the course you should obtain a common understanding of projects and their complexity. Reducing risks in international projects, communicating with your project team members/management/suppliers/customers more efficiently, detecting and solving problems, etc. are |

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| | side effects that you will become aware of. |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | Written final exam; continuous assessment; commitment in class, participation and home assignments/case study |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | |
| **References** (max. 3 that are key for the programme/project) | Carroll J; Agile Project Management, Pearson, Leamington Spa 2012; Gareis R; Happy Projects; 2nd ed., Manz, Wien 2004;<br>Litke H.D. (Hrsg.); Projektmanagement - Handbuch für die Praxis; Hanser, München-Wien 2005;<br>Newton R; Project Management. Step by Step; Prentice Hall Business, Harlow 2006;<br>Patzak G, Rattay G; Projektmanagement, Leitfaden zum Management von Projekten, Projektportfolios und projektorientierten Unternehmen; 4th ed., Linde, Wien 2004;<br>Reiss G; Project Management Demystified; 3rd ed., Routledge, New York 2007; http://www.ipma.at; http://www.pmi.org/ |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot-Uebersicht/department-angewandte-informatik/ima/Studium/~uqs/IMA-lvdetails/?alvid=4352549930&lan=en |

# Annex 30

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

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|---|---|
| **Title** | Computer Vision |
| **Institution / Department** | Software Design |
| **Lecturer** | Priv. Doz. Dr. techn. Dipl. Ing KAMPEL Martin |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components |
| **ECTS** | 2,5 |
| **Level** | 5. semester |
| **Prerequisite(s)** | Fundamentals Computer Science/Software Engnieerung |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | |
| **list/enumeration of themes/topics that should be mastered during the course** | * Resolution, Sampling, Color Imaging * Image processing: Image error correction, edge detection * Segmentation: based on edges or regions * Image compression: predictive coding, JPEG, MPEG * Image vision: motion detection, object tracking * 3D Vision: 3D Recording and Reconstruction * Applications and Programming Methods |
| **Competences/Learning objectives** (max. 1.500 characters) | After passing this course successfully students are able to ...<br>- explain an image acquisition process (2D and 3D)<br>- analyse image sequences to detect changes and objects<br>- estimate project efforts as well as perform feasibility studies in the field of Computer Vision |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Continuous Assessment |
| **References** (max. 3 that are key for the programme/project) | Books: Current scientific articles Professional Journals |

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| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot-Uebersicht/department-angewandte-informatik/swd/Studium/~uqq/SWD-lvdetails/?alvid=4350897089&lan=en |

# Annex 31

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Story and Visualisation 1 |
| **Institution / Department** | Communication, Media, Sound and Interaction design |
| **Lecturer** | KIPCAK Orhan |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 2 |
| **Level** | 2. semester |
| **Prerequisite(s)** | Knowledge of IT systems, basic knowledge of graphic, video and audio software; dependent on the respective course. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Design and development of storyboards in order to visualise scripts and plan single scenes. Realisation of a script in pictures and concrete design such as perspectives, angle and field sizes. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Comprehensive artistic and theoretic skills in the field of time-based media |

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| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation /Grading basis/Form of control** (exams, project work, …) | immanent examination character |
| **References** (max. 3 that are key for the programme/ project) | Books: Jeff Bellatoni, Matt Woolman: TYPE in MOTION – innovative digitale gestaltung Bob Cotton/Rich Oliver „Understanding Hypermedia“ Robert Jacobson (ed.), „Information Design“, Cambridge, 1999 Isaac Victor Kerlow – „The Art of 3-D Computer Animation and Imaging“ John Wiley & Sons, 2003; James Foley et al. – „Computer Graphics, Principles and Practice“ von Foley Addison Wesley, 2003; Alan Watt – “3D Computer Graphics” Gene Youngblood: Expanded Cinema Journals: Create Digital Motion, Create Digital Music, Production Partner, E-Musician, Neural |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/cmi/CMI_Studium/~ctca/cmi_lvdetails/?alvid=4358065653&lan=en |

# Annex 32

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Basics of Software Engineering |
| **Institution / Department** | Information Management |
| **Lecturer** | Dipl.-Ing. LADSTÄTTER Robert |
| **Language** | Englisch |
| **Type/Class format/Program structure (number of lectures, practical classes, other work)** | Integrated lecture: comprised of lectures and hands on components |
| **ECTS** | 5 |
| **Level** | 3.Semester |
| **Prerequisite(s)** | Learning outcomes of modules INFO Basics, Advanced, ENG Basics 1 & 2 |
| **Overall description + Relation to Game Industry (max. 2.500 characters)** | Building on the course "Informatics Advanced" which aimed at getting first contact to programming and algorithmic design this course will mainly focus on the OOP (Object Oriented Programming) paradigm. Moreover, first contact to Android mobile application development will be established. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives (max. 1.500 characters)** | Besides gaining more programming skills students will also be given an introduction to common software engineering methods and tools (software process models, requirements engineering methods, testing, etc.). |
| **Outcomes (max. 1.500 characters)** | |
| **Assignments (example if available)** | |
| **Evaluation/Grading basis/Form of control (exams, project work, …)** | final exam, continuous assessment |
| **References (max. 3 that are key for the programme/project)** | |

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| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot-Uebersicht/department-angewandte-informatik/ima/Studium/~uqs/IMA-lvdetails/?alvid=4352549966&lan=en |

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Basics of Software Engineering |
| **Institution / Department** | Information Management |
| **Lecturer** | Dipl.-Ing. LADSTÄTTER Robert |
| **Language** | Englisch |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components |
| **ECTS** | 5 |
| **Level** | 3.Semester |
| **Prerequisite(s)** | Learning outcomes of modules INFO Basics, Advanced, ENG Basics 1 & 2 |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Building on the course "Informatics Advanced" which aimed at getting first contact to programming and algorithmic design this course will mainly focus on the OOP (Object Oriented Programming) paradigm. Moreover, first contact to Android mobile application development will be established. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Besides gaining more programming skills students will also be given an introduction to common software engineering methods and tools (software process models, requirements engineering methods, testing, etc.). |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | final exam, continuous assessment |

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| **References** (max. 3 that are key for the programme/project) | |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot-Uebersicht/department-angewandte-informatik/ima/Studium/~uqs/IMA-lvdetails/?alvid=4352549966&lan=en |

# Annex 33

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Business Planning (KPI's, Project Evaluation) |
| **Institution / Department** | Management/International Industrial Management |
| **Lecturer** | DI Mari lymysalo, Mag. Dr. Christian Bischof, MBA |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components |
| **ECTS** | 3 |
| **Level** | 3. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | • preparation, conception and creation of professional business plans that will convince decision makers, investors and banks.<br>• Find, plan and control of key performance indicators (KPI)<br>• Controlling business ideas and investments with business plans<br>• Evaluation of projects (concepts, instruments, limits)<br>• project performance measurement<br>• case studies |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | |

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| **Assignments** (example if available) | Final exam and continuous assessment |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | |
| **References** (max. 3 that are key for the programme/ project) | |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_management/iim/Studium/~cctv/IIM_lvdetails/?alvid=4352604685&lan=de |

# Annex 34

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Creative Writing 1 |
| **Institution / Department** | Information design |
| **Lecturer** | Mag. MAREK Christoph |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar: lecture, presentations, individual work, small group work; work in editorial teams |
| **ECTS** | 2 |
| **Level** | 1. semester |
| **Prerequisite(s)** | |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Professional writing is a craft that can be learned. This is the motto of the seminar. Based upon the question of what constitutes a (good) text, the seminar systematically shows various ways of composing a text and the rules accordingly applied. Besides the analysis of sample texts and discussions on different writing styles and genres emphasis lies on writing own texts. Additionally, an overview of proof-reading and editorial work is given. Focus also lies on descriptions of themselves and others and on project presentations. Aims: Students should get an understanding of what makes a good text. Hereby focus lies on the balance between form, style and content: students learn to assess different communication situations correctly and to chose the adequate focus in form, style and content. This seminar is only held in German and is not suitable for incoming students. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competenc** | |

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| **es/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | Generation and Preparation of Content |
| **Assignments** (example if available) | presentations, individual work, small group work; work in editorial teams |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Assessment of written works, tests |
| **References** (max. 3 that are key for the programme/ project) | Baumert, Andreas: Professionell texten. Grundlagen, Tipps und Techniken. 2. Auflage. München: dtv, 2008. Clark, Roy Peter: Die 50 Werkzeuge für gutes Schreiben. Handbuch für Autoren, Texter und Journalisten. Berlin: Autorenhaus Verlag, 2009. Dudenredaktion (Hrsg.): Duden. Die deutsche Rechtschreibung. 25. völlig neu bearbeitete und erweiterte Auflage. Mannheim: Dudenverlag, 2008. Fasel, Christoph: Textsorten. Konstanz: UVK, 2008. Förster, Hans-Peter: Texten wie ein Profi. 11. Auflage. Frankfurt: F.A.Z.-Institut für Management-, Markt- und Medieninformationen, 2010. Häusermann, Jürg: Journalistisches Texten. Sprachliche Grundlagen für professionelles Informieren. Konstanz: UVK, 2001. Heiser, Albert: Bullshit Bingo. Storytelling für Werbetexte. Berlin: Creative Game Verlag, 2009. Lehmanski, Dirk und Michael Braun (Hrsg.): Das Schreibbuch. Das Handbuch für alle, die professionell schreiben. 2. Auflage. Waltrop: ISB-Verlag, 2009. |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4352575553&lan=en |

# Annex 35

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Multimedia Product Development 1 - User Centered |
| **Institution / Department** | Information Management |
| **Lecturer** | FH-Prof. Dipl.-Ing. Dr. NISCHELWITZER Alexander |
| **Language** | |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components |
| **ECTS** | 4 |
| **Level** | 1. Semester |
| **Prerequisite(s)** | Multimediaprogramming<br>Programming<br>Web Technologies |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | In this course the students learn how to plan, realize and evaluate Rich Internet Applications. Therefore the principles of user centered design, usability, game design and interaction design are taught. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | The result of these lecture is a functional prototype of a Rich Internet Application, which has been developed by the students taking in account the most important factors for usability, accessibility, User Interface design and graphical design. |
| **Assignments** (example if available) | Project, Presentations, Deliverables |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | |
| **References** (max. 3 that are key for the programme/project) | Designing the User Interface, Ben Shneiderman<br><br>Usability – Nutzerfreundliches Web-Design |

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| | Markus Beier, X.media.press, Springer Verlag |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot-Uebersicht/department-angewandte-informatik/aim/Studium/~bpqq/aim-lvdetails/?alvid=4352558597&lan=en |

# Annex 36

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Applied Game Design |
| **Institution / Department** | Department for Media and Design / Study degree: Bachelor in information design |
| **Lecturer** | FH-Prof. DI Dr. PIVEC Maja |
| **Language** | Englisch |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components<br>Group work, Pecha Kucha, Lectures |
| **ECTS** | 3 |
| **Level** | 3. Semester |
| **Prerequisite(s)** | |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Draft, graphic realisation and analysis of the technical realisation of computer games in small groups<br><br>Research of diverse gaming mechanisms. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | Generation and Preparation of Content |

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| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Presentation of a game concept |
| **References** (max. 3 that are key for the programme/ project) | Baumert, Andreas: Professionell texten. Grundlagen, Tipps und Techniken. 2. Auflage. München: dtv, 2008.<br>Clark, Roy Peter: Die 50 Werkzeuge für gutes Schreiben. Handbuch für Autoren, Texter und Journalisten. Berlin: Autorenhaus Verlag, 2009.<br>Dudenredaktion (Hrsg.): Duden. Die deutsche Rechtschreibung. 25. völlig neu bearbeitete und erweiterte Auflage. Mannheim: Dudenverlag, 2008.<br>Fasel, Christoph: Textsorten. Konstanz: UVK, 2008.<br>Förster, Hans-Peter: Texten wie ein Profi. 11. Auflage. Frankfurt: F.A.Z.-Institut für Management-, Markt- und Medieninformationen, 2010.<br>Häusermann, Jürg: Journalistisches Texten. Sprachliche Grundlagen für professionelles Informieren. Konstanz: UVK, 2001.<br>Hanika, Iris & Stefanie Flamm (Hrsg.): Berlin im Licht. 24 Stunden Webcam. Frankfurt/M: Suhrkamp, 2003.<br>Heiser, Albert: Bullshit Bingo. Storytelling für Werbetexte. Berlin: Creative Game Verlag, 2009.<br>Lehmanski, Dirk und Michael Braun (Hrsg.): Das Schreibbuch. Das Handbuch für alle, die professionell schreiben. 2. Auflage. Waltrop: ISB-Verlag, 2009.<br>Linke, Angelika et al.: Studienbuch Linguistik. 5. erweiterte Auflage. Tübingen: Niemeyer, 2004.<br>Ortheil, Hanns-Josef: Schreiben dicht am Leben: Notieren und Skizzieren. Mannheim: Dudenverlag, 2012.<br>Porombka, Stephan: Kritiken Schreiben. Ein Trainingsbuch. Konstanz: UVK, 2006.<br>Porombka, Stephan: Schreiben unter Strom. Experimentieren mit Twitter, Blogs, Facebook & Co. Mannheim: Dudenverlag, 2012.<br>Schärf, Christian: Schreiben Tag für Tag. Journal und Tagebuch. Mannheim: Dudenverlag, 2012.<br>Schneider, Wolf: Deutsch für Kenner. Die neue Stilkunde. 5. Auflage. München: Piper, 2009.<br>Wehrli, Peter K.: Katalog von Allem. 1111 Nummern aus 31 Jahren. München: Goldmann, 2000.<br>Serious Games: Games that educate, Train, and Inform.<br>David Michael & Sande Chen; Game Design Workshop: A Playcentric approach to creating innovative games.<br>Tracy Fullerton; The Art of Game Design.<br>Jesse Schell; Level Up!: The guide to great video game design. |

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|---|---|
| | Scott Rogers; How to create Fantasy Art for video games.<br>Bill Stoneham; The ultimate guide to Video Game writing and Design.<br>Flint Dille & John Platten. |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4352575664&lan=en |

# Annex 37

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | 3D-Modelling |
| **Institution / Department** | Media and Design/3D-Modelling |
| **Lecturer** | DI (FH) Thomas Radeke |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar, partly blocked |
| **ECTS** | 1 |
| **Level** | 1. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The students will learn basic concepts and usage of digital 3D technology. Fields of use include visualisations, still images and simulations in the graphical and artistic design process. |
| **list/enumeration of themes/topics that should be mastered during the course** | The course topics are:<br>• Modelling of simple and medium-complexity objects<br>• Creating a variety of materials and surfaces<br>• Scene layout, management, optimisation and lighting<br>• Simulation of realistic lighting situations<br>• Still image rendering (animations are scheduled for the 2nd semester) |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | Basics of Information Technology for designers as well as of 3D and Usability Testing |

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|---|---|
| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Final project |
| **References** (max. 3 that are key for the programme/ project) | Books: Isaac Victor Kerlow, The Art of 3-D Computer Animation and Imaging, John Wiley & Sons 2003; Steve Krug (2009): Rocket Surgery Made Easy: The Do-it-yourself Guide to Finding and Fixing Usability Problems. Steve Krug (2014): Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability. Journals, Websites: User Experience Professionals Association: https://uxpa.org/ German Usability Professionals Association: http://www.germanupa.de/ |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4352575397&lan=en |

# Annex 38

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | 3D-Modelling and 3D-Animation |
| **Institution / Department** | Media and Design/3D-Modelling and 3D-Animation |
| **Lecturer** | DI (FH) Thomas Radeke |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar, partly blocked |
| **ECTS** | 3 |
| **Level** | 2. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Animation, special techniques, various render technologies, post production |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | Basics of Programming for designers as well as of 3D and User-centered Design |

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| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Final project |
| **References** (max. 3 that are key for the programme/ project) | Jeremy Birn, Digital Lighting and Rendering, 3. Auflage 2013; Alan Cooper (2004) The Inmates Are Running the Asylum: Why High-tech Products Drive Us Crazy and How to Restore the Sanity; Kim Goodwin (2009) Designing for the Digital Age: How to Create Human-Centered Products and Services. Journals, Websites: Association for Computing Machinery, ACM www.acm.org ACM SIGCHI, Special Interest Group in Human-Computer Interaction http://www.sigchi.org/ |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4353757896&lan=en |

# Annex 39

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | App Design 2 |
| **Institution / Department** | Communication, Media, Sound and Interaction design |
| **Lecturer** | REISCHER Matthias |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 2 |
| **Level** | 3. Semester |
| **Prerequisite(s)** | Dependent on the respective course |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Design focused development for mobile devices (smartphone, tablet, iOS and Android). |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Skills in interaction and interface design of interactive media as well as in the field of advanced technologies (touchless interfaces, media spaces, sensory environments) |

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| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation /Grading basis/Form of control** (exams, project work, …) | immanent examination character |
| **References** (max. 3 that are key for the programme/ project) | Books: Steven Poole, Trigger Happy Programming Interactivity: A Designer's Guide to Processing, Arduino, and OpenFrameworks Massimo Banzi, Getting Started with Arduino Cooper, Reimann Cronin: About Face: Interface und Interaction Design Interaction Design Beyond HumanComputer Interaction Journals: ACM: interactions, Reality |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/cmi/CMI_Studium/~ctca/cmi_lvdetails/?alvid=4354945086&lan=en |

# Annex 40

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Entrepreneurship |
| **Institution / Department** | IT-LAW & Management |
| **Lecturer** | Mag. SCHABEREITER Wolfgang, MA |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 2 |
| **Level** | 2. semester |
| **Prerequisite(s)** | Basic knowledge in busines studies |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The course Entrepreneurship is dedicated to help the students as entrepreneurs make educated decisions about starting and growing their businesses. The students aim to promote the economy, through the development of products and services that encourage entrepreneurship and support business growth. They will be informed about financial government support programmes. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Students become a structured overview of the principles in business studies and management.<br>Students gain competences in solving conflicts in organisations and assessing risks in IT projects |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Continuous assessment or seminar work |
| **References** (max. 3 that are key for the programme/project) | Becker, Grundlagen der Unternehmensfinanzierung, ISBN 3-478-37450-2;<br>SERVICE LEVEL AGREEMENTS: A FRAMEWORK ON CD-ROM FOR IT AND TECHNOLOGY 2003 - 10th |

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| | EDITION;<br>Hinterhuber: Strategische Unternehmensführung;<br>Gutschelhofer: Controllingorientierte Unternehmensführung;<br>Baum, Coenenberg: Günther: Strategisches Controlling;<br>Lock: Projektmanagement;<br>Fiedler: Einführung in das Controlling;<br>Fiedler: Controlling von Projekten;<br>Friedag, Schmidt: e-Controlling;<br>Michael: Projektcontrolling |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot-Uebersicht/department-angewandte-informatik/irm/Studium/~bmei/irm-lvdetails/?alvid=4356781020&lan=en |

# Annex 41

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | International Business |
| **Institution / Department** | Management/International Management (Bachelor) |
| **Lecturer** | MMag. Martin Schaffar, Mag. Dr. Christian Hirt |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components, 2 groups, 3 THW, 5 ASWS |
| **ECTS** | 4 |
| **Level** | 1. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | This introductory course focuses on the opportunities and risks of the complex environment of international business, with an emphasis on the unique challenges involved in managing international operations. Main topics include foreign economic, political, legal and cultural environments, international trade, organizational structure as well as international marketing.<br><br>Additionally, this course is accompanied by several guest speakers from companies in different industries in order to improve the students understanding which challenges companies are confronted with in their international business activities. |
| **list/enumeration of themes/topics that should be mastered during the course** | The course's primary goal is to provide students with a comprehensive introduction of the global business environment, especially with regards to political, economic, legal and cultural issues and improve their understanding in the way multinational companies operate, regarding strategic choices and its implementation of organizational structure decisions. |
| **Competences/Learning objectives** (max. 1.500 characters) | |

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| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | 1.) Facing International Challenges - Questions/Answers for Guest Speakers<br><br>2.) Presentation / Activity<br><br>3.) Exam |
| **References** (max. 3 that are key for the programme/ project) | Cavusgil, T.S.; Knight, G. Riesenberger, J.R (2014): International Business: The New Realities, Pearson |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_management/mig/Studium/~uql/MIG_lvdetails/?alvid=4351841687&lan=en |

# Annex 42

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Generative Design 2 |
| **Institution / Department** | Information Design |
| **Lecturer** | Schitter Ulrike |
| **Language** | |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Integrated lecture: comprised of lectures and hands on components |
| **ECTS** | 3 |
| **Level** | 4th semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Realisation of a concrete project in the field of infographics, web design or iterative visualisations. |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Advanced autonomous realisation of independent design proscesses. Implementation of various media, acquisition of professional and creative competence facing social and economic tasks and challenges. |
| **Outcomes** (max. 1.500 characters) | |

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| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Project and presentation |
| **References** (max. 3 that are key for the programme/ project) | |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4353758255&lan=de |

# Annex 43

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Generatives Design 1 |
| **Institution / Department** | Media and Design/ Generatives Design 1 |
| **Lecturer** | Ulrike Schitter |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 3 |
| **Level** | 3. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Basics and conception of dynamic images; basics of research into components, programming languages, specific use of creative instruments, development of a typography, colour and form canon |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | Processing and realising concrete pratical tasks, gaining basics in specific prgramming languages and their possible fields of application |

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| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Project and Presentation |
| **References** (max. 3 that are key for the programme/ project) | Ina Saltz, Typografie – 100 Prinzipien für die Arbeit mit Schrift Ulrike Felsing, Dynamische Erscheinungsbilder im kulturellen und öffentlichen Kontext; Irene van Mees, Dynamic Identities. How to create a living brand |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4352575731&lan=en |

# Annex 44

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Media Production |
| **Institution / Department** | Information Design |
| **Lecturer** | • SCHMIEDEL Horst<br>• DI (FH) BIEDER Albert<br>• GOKL Robert<br>• SCHERZ Wolfgang<br>• STEFFENS Martin |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | PT ? |
| **ECTS** | 7 |
| **Level** | 3. Semester |
| **Prerequisite(s)** | |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | |
| **list/enumeration of themes/topics that should be mastered during the course** | Development of narrative forms, production concept, production design, camera and lighting technology, sound recording technology, media technological content such as technical formats, codecs, etc |
| **Competences/Learning objectives** | |

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| (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | Technical and creative skills in the field of sound design and video production and postproduction. Using these skills in first practical projects. |
| **Assignments** (example if available) | |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Final project, permanent assessment |
| **References** (max. 3 that are key for the programme/ project) | Peter Hant, Das Drehbuch. Praktische Filmdramaturgie, Hamburg 1992 Marcie Begleiter, Peter Robert: "Storyboard : Vom Text zur Zeichnung zum Film", Verlag Zweitausendeins Scott McCloud: Comics machen - Alles über Comics, Manga und Graphic Novels, Hamburg 2007 |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4352575820&lan=en |

# Annex 45

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Visual Communication Basics |
| **Institution / Department** | Information Design |
| **Lecturer** | SEIDL Johannes,  FRITZ Herms<br> FH-Prof. DI Dr. BAUMANN Konrad<br> MMag.art OSTERIDER Martin<br> FH-Prof. Mag. MOSCHIK Melitta<br> Diplomgrafikerin ROLLIER Catherine<br> BOBINEC Tomislav |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Project work |
| **ECTS** | 7 |
| **Level** | 1. Semester |
| **Prerequisite(s)** | None |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | |
| **list/enumeration of themes/topics that should be mastered during the course** | Analytical work on perception, basics of visual communication: conceptual drafting, drawing, photographic representation, artistic formulation, letter design and semiotics, nature studies, analogue and digital draft techniques, ethics of design, iconography, creativity |
| **Competences/Learning** | Basic knowledge of drafting methods, handicraft training |

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| **objectives** (max. 1.500 characters) | |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | Project work, project documentation |
| **Evaluation/ Grading basis/Form of control** (exams, project work, …) | Active participation, project presentation and submission of project documents as defined by the supervisor |
| **References** (max. 3 that are key for the programme/ project) | Piktogramme und Icons: Pflicht oder Kür, Hrg. Rayan Abdullah,<br><br>Grundlagen der Typografie/Gavin Ambrose, Paul Harris, Annette Gevatter, Druckreif, Paul Renner,<br>Die Kunst der Typographie, Emil Ruder,<br>Typographie – ein Gestaltungslehrbuch, Ina Saltz,<br>Typografie – 100 Prinzipien für die Arbeit mit Schrift,<br>Helmut Schmid, Gestaltung ist Haltung |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/ind/Studium/~urm/IND_lvdetails/?alvid=4352575632&lan=en |

# Annex 46

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | SW-Engineering - Mobile and Location based Computing |
| **Institution / Department** | Information Management |
| **Lecturer** | SPRUNG Gerhard, MSc, FH-Prof. Dipl.-Ing. Dr. NISCHELWITZER Alexander |
| **Language** | German |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Seminar |
| **ECTS** | 5 |
| **Level** | 5. Semester |
| **Prerequisite(s)** | Learning Outcomes of module SWE Basics 1, Advanced, Selective; DMT Basics 1, 2, Advanced; DBS Basics, Advanced |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The course deals with the use of mobile devices as runtime environments for applications. It is demonstrated how we can use various technologies (like client-server communication, XML-Sockets, etc). It is demonstrated how to create and test platform-independent, rich multimedia programs. We will discuss the opportunities and limitations of various mobile technologies (like smartphones, smartpens, tablets, etc.). |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Students can assess the possibilities of mobile devices as an interface for information systems and identify specific scenarios, in which the application of mobile devices show a considerable added value.<br>Students are able to design, define and implement appropriate user interfaces for mobile interfaces.<br>Students know the limitations, risks and opportunities of mobile applications and devices. |
| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |

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| **Evaluation/Grading basis/Form of control** (exams, project work, …) | continuous assessment, final report |
| **References** (max. 3 that are key for the programme/project) | About Face: Interface und Interaction Design, Alan Cooper, ISBN-13: 978-3826658884 (Edition 2010)<br>Diverse articles in the area of mobile computing |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot-Uebersicht/department-angewandte-informatik/ima/Studium/~uqs/IMA-lvdetails/?alvid=4352553148&lan=en |

# Annex 47

**Name of provider / GameHub partner institution / country: FH JOANNEUM/Austria**

| | |
|---|---|
| **Title** | Video and Animation 2 |
| **Institution / Department** | Communication, Media, Sound and Interaction Design |
| **Lecturer** | |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | seminar |
| **ECTS** | 3 |
| **Level** | 3. Semester |
| **Prerequisite(s)** | Knowledge of IT systems, basic knowledge of graphic, video and audio software; dependent on the respective course. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Design and development of 2D and 3D animation with and without motion tracking technologies. Professional use of respective analogue and digital tools. Language: English |
| **list/enumeration of themes/topics that should be mastered during the course** | |
| **Competences/Learning objectives** (max. 1.500 characters) | Comprehensive artistic and theoretic skills in the field of time-based media |

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| **Outcomes** (max. 1.500 characters) | |
| **Assignments** (example if available) | |
| **Evaluation /Grading basis/Form of control** (exams, project work, …) | immanent examination character |
| **References** (max. 3 that are key for the programme/ project) | Books: Jeff Bellatoni, Matt Woolman: TYPE in MOTION – innovative digitale gestaltung Bob Cotton/Rich Oliver „Understanding Hypermedia“ Robert Jacobson (ed.), „Information Design“, Cambridge, 1999 Isaac Victor Kerlow – „The Art of 3-D Computer Animation and Imaging“ John Wiley & Sons, 2003; James Foley et al. – „Computer Graphics, Principles and Practice“ von Foley Addison Wesley, 2003; Alan Watt – “3D Computer Graphics” Gene Youngblood: Expanded Cinema Journals: Create Digital Motion, Create Digital Music, Production Partner, E-Musician, Neural |
| **Hardware and software required** | |
| **Webpage** | http://www.fh-joanneum.at/aw/home/Studienangebot_Uebersicht/department_medien_design/cmi/CMI_Studium/~ctca/cmi_lvdetails/?vlvid=4349644577&lan=en |

# Annex 48

**Name of provider / GameHub partner institution / country: UDEUSTO**

| | |
|---|---|
| **Title** | MakeWorld: learning Science through Computational Thinking |
| **Finacial support / Funding** | Erasmu+ Strategic Partnership for School Education 2014-1-ES01-KA201-004966 |
| **Target group** | Primary school students and teachers |
| **Initial situation** | Despite we are living in an increasingly technological world, the decline in scientific vocations in the last decade is inexorable. The EC warned of this fact, and Fensham stated that the two main problems have to solve science education in the long term would be negative attitudes and lack of interest around it. Other reports (Rocard, PISA, ROSE) provide evidence of the loss of youth interest in courses in STEM. The situation is alarming from a gender perspective, considering women have gone from a presence of 35% in the technology sector in 1980 to a meager 15% today. Therefore, the motivation of this project is to provide teachers and students with the methodologies and tools for teaching and learning of STEM high quality. |
| **Objectives + Relation to Game Industry** | The project aims at developing a powerful and high-quality set of resources and tools to develop and assess STEM and ICT competencies, as well as a dashboard to monitor student's progress and behavior. Students, through their teacher, are final users of the open educational resources and platform. They will have a flexible, attractive and innovative educational tool to develop STEM and Computational competencies. Students will have resources ready to be used and learn with them, but the GAMIFIED platform enables them to modify, even to create from scratch characters, worlds and stories. They can be authors of open educational resources, encouraging an active participation in their learning and promoting their creativity. Students, with available learning resources, will become protagonists of their learning, and will manage the resources at their disposal. |
| **Description of activities** | 1) Analyze the attitudes and skills around STEM of teachers and elementary students.<br>2) Design and define a methodology for the teaching and learning of STEM, leveraging the engagement of social and gamified platforms, story-telling, computational thinking, social assessment and personalized learning.<br>3) Develop an open, free, open source and expandable platform to promote a symbiotic relationship between STEM learning and computational thinking.<br>4) Create initial content and activities for the platform to facilitate its use with different levels of involvement.<br>5) Assess the quality and impact of the project after its implementation, both in terms of attitudes and skills about |

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| | STEM schools, and the quality of the methodology, platform, and initial materials developed. |
| **Expected results** | - Make World platform to play, remix and create worlds and stories<br>- A set of ready-to-use educational resources<br>- Teachers‘ guide to integrate Make World in the curriculum |
| **Coordinating institution** | University of Deusto |
| **Partner institutions** | Fundación Educativa ACI Esclavas SC-Fatima (Spain)<br>Computer Technology Institute & Press Diophantus (Greece)<br>Ekpaideutiria Douka (Greece)<br>Warsaw Billingual School (Poland) |
| **Webpage** | http://makeworld.eu/ |

# Annex 49

**University of Deusto / GameHub P01 / Spain:**

| | |
|---|---|
| **Title** | Programming I |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Unai Aguilera |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Activities in the classroom (70%):<br>-Presentation lectures for the delivaring of content and activating the cognitive processes of the student: 10% (0,6 ECTS).<br>-Permorming exercises and practical testing of previously acquired knowledge: 60% (2,4 ECTS).<br>-Practical lectures advised by the teacher, in which it will be put into practice the knowledge acquired in the rest of activities performed in the classroom: 20% (1,2 ECTS).<br>-Activities outside the classroom (30%):<br>-Individual study of the collected material during the activities carried out in the classroom, and solving the proposed tasks to achieve autonomous and significant learning and to complete the preparation of objective tests and the team project (1,8 ECTS). |
| **ECTS** | 6 |
| **Level** | 1st course of a Bacherlor's degree in Computer Engineering |
| **Prerequisite(s)** | N/A |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The final design, development, tests and implementation of applications using different programming tools and programming lenguages. This subject is the first contact of students with programming and provides basic theoretical and practical concepts. |
| **list/enumeration of themes/topics that should be mastered during the course** | T1 Introduction to computers<br>Structure of a computer, operating systems and databases.<br>T2 Introduction to Programming<br>Phases of a computer problem; algorithm; instruction; program; programming languages; phases of programming; debugging.<br>T3 Key elements<br>Objects in the environment; constant objects and variables; elemental data and user-defined data types.<br>T4 Elemental Actions<br>Action allocation; expressions and operators; Precedence rules; read and write actions; predicates; logical operators.<br>T5 Control Structures<br>Action's structure; sequential structure or composition; selective structure or composition; types; composition or |

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| | repetitive structure; types; structured programming<br>T6 Subprograms<br>Named action; parameterized subprograms; types of parameters; functions; scope; declaration; modular programming.<br>T7 Basics of OOP (object orientated programming)<br>Basic concepts of object orientation: classes, objects, attributes, methods, encapsulation, inheritance.<br>T8 Arrays<br>Linear and multi-dimensional arrays, both native types as objects. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | 1) Specify, design and implement algorithms in an object-oriented programming language, using efficient, systematic and organized methods for problem solving.<br>2) Write correctly, compile and run programs in high-level language.<br>3) Using efficiently in algorithms the static data structure array<br>4) Teamwork, time management, project development |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | ORDINARY CALL<br>REGULAR EVALUATION ACTIVITIES (70% of the final grade)<br>Monitoring controls:<br>Part 1: -Part 5: Evaluation of the student's knowledge objectives through problems partial and / or activities developed by the student aimed at achieving the project.<br>.<br>GLOBAL ASSESSMENT ACTIVITY (30% of the final grade)<br>Written test for solving exercises and global problems where the minimum knowledge will be assessed from the student. He must obtain a passing score on this test to pass the course.<br>EXTRAORDINARY CALL<br>GLOBAL ASSESSMENT ACTIVITY<br>Written test for solving exercises and global problems where the minimum knowledge will be assessed from the student. He must obtain a passing score on this test to pass the course. Student will be given the option to recover 75% of the grade of continuous evaluation through exercises in this test and similar tests developed during the course. |
| **References**<br>(max. 3 that are key for the programme/project) | "Python. Crear, Modificar, Reutilizar". Edicion: 2009<br>Jim Knowlton, Editor: ANAYA MULTIMEDIA/WROX; ISBN-10: 8441525137; ISBN-13: 978-8441525139<br>"Learning Python the Hard Way". 3ª Edición. 2013. |

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| | Zed A. Shaw, Editor: ADISON; ISBN-10: 0321884914; ISBN-13: 978-0321884916<br>"Learning Python". 5ª Edición. 2013.<br>Mark Lutz, Editor: O'REILLY MEDIA; ISBN-10: 1449355730; ISBN-13: 978-1449355739 |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 50

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Programming II |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Andoni Eguiluz |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | *Theory classroom*- Participatory presentation. The teacher presents topics in lectures supported by audiovisual methods (transparency projector, video projector, Internet). Questions are made to increase student participation. 25% (1.5 ECTS).<br>*Computer room* - Practical work. The teacher with small groups of students proposes simple exercises to be performed with the editor and Java compiler. With provided time students based on teacher guidance get experience and achieve the practice objectives. The assignments could be performed in class and completed at home. 25% (1.5 ECTS).<br>*Computer room* – Project development. Computer problem analysis, integration of developed modules and completion of remaining modules using the Java programming language. Testing and debugging the obtained code for final delivery. 10% (0.6 ECTS).<br>Home assignment - Guided study. The teacher gives references, literature and source code to be analyzed to complete the understanding of the different concepts studied in the subject. 10% (0.6 ECTS).<br>Home assignment - Project development. Computer problem analysis, integration and implementation of developed modules and completion of remaining modules using the Java programming language. Testing and debugging the obtained code for the final delivery. 30% (1.8 ECTS). |
| **ECTS** | 6 |
| **Level** | 1st course of a Bacherlor's degree in Computer Engineering |
| **Prerequisite(s)** | Basic knowledge of structured programming and basics of OOP. It is advisable to have completed the course "Programming I" of the first half. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The graduate designs, develops, tests and implements applications using different programming tools and programming lenguages. This subject explores theoretical and practical knowledge of the algorithms and object-oriented programming using the Java programming language. |
| **list/enumeration of themes/topics that** | Topic 1. Introduction: advanced concepts of OOP, inheritance, polymorphism and composition programming. |

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| **should be mastered during the course** | Topic 2. Packages: definition and utility of packages in Java, organizing classes in packages, location and class visibility, classpath.<br>Topic 3. Interfaces: multiple inheritance and using interfaces, definition and implementation, inheritance between interfaces, interfaces and abstract classes.<br>Topic 4. API: Java API, organization and structure of packages and classes, use of the API help, main packages and classes.<br>Topic 5. Generic types in Java: data collections, generics, collections, iterators, enumerations.<br>Topic 6. Exceptions: definition, error detection, exception handling, blocks try ... catch ... finally, relaunch, hierarchy, creating own exceptions, implicit and explicit exceptions, obtaining information from a exception.<br>Topic 7. Visual programming: the AWT / Swing libraries, components and containers definition, analysis of the most usual, creating custom windows, organization and distribution of elements: layouts, use of an IDE for designing interfaces: Eclipse and Visual Editor.<br>Topic 8. Events: event management, event management model: listeners and event sources.<br>Topic 9. Threads: basics of multithreaded programming considerations about threads in the Java windows system |
| **Competences/Learning objectives** (max. 1.500 characters) | The following three specific competences are worked:<br>- SPECIFIC COMPETENCE CE1. Design classes and algorithms using the Java language to solve varied problems about programming. Test and debug the code performed until proper behaviour is obtained.<br>- SPECIFIC COMPETENCE CE2. Develop code using high-level tools (integrated development environment).<br>- SPECIFIC COMPETENCE CE3. Adequately integrate to the application development some elements of certain coding complexity: interfaces, exceptions, events and threads. |
| **Outcomes** (max. 1.500 characters) | N/A |
| **Assignments** (example if available) | N/A |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | In the course, it will be proposed the realization of a small individual programming project, according to a model that will be worked in class and used as a reference project. This project will be addressed in successive deliveries along the course and a final delivery at exams time.<br>In order to pass the course, you will need to pass an objective test that will ensure that the knowledge reached by the student is the minimum required. In case of not passing this test, the qualification will be gotten from the test as a final grade for the course instead of calculating it as follows. |

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| | CONTINUOUS EVALUATION ACTIVITIES (40% of score)<br>Collection of two assignments corresponding to the evolution of the project with a delivery date limit for each of them (throughout the development of the course):<br>* Partial project delivery 1 (E1): Module: Basic classes, inheritance and interfaces. (5% of the final grade).<br>* Partial project delivery 2 (E2): Module: Exceptions, containers, Java Collections and GUI design. (5% of final score).<br>During the development of the subject 3 practices will be imparted grouping the knowledge of previous weeks of master classes. The evaluation of each of the practices will be carried out through a mandatory modification on personal practice of each student. This practical assessment will be made on the computer.<br>* Test 1 (E3): Test of solving exercises in computer changing the monthly practice (10% of the final grade).<br>- Exercises performed during practical class time.<br>- Formative evaluation, with rating communication and subsequent explanation of the correct resolution.<br>* Test 2 (E4): Test of solving exercises in computer changing the monthly practice (10% of the final grade).<br>- Exercises performed during practical class time.<br>- Formative evaluation, with rating communication and subsequent explanation of the correct resolution.<br>* Test 3 (E5): Test of solving exercises in computer changing the monthly practice (10% of the final grade).<br>- Exercises performed during practical class time.<br>- Formative evaluation, with rating communication and subsequent explanation of the correct resolution.<br>GLOBAL ASSESSMENT ACTIVITIES (60% of score)<br>Global assessment activities includes two tests at the end of the semester:<br>- E7. Final exam: Machine test solving exercises and global issues in computer room (30%)<br>- E8. Individual project validation in computer room: Check tracking code and test slight modification on the project. (30%)<br>Students who fail the continuous assessment have the opportunity to recover 75% of the grade of the deliveries of modules (E1 to E2) in project delivery.<br>Looking ahead to the extraordinary assessment, the mark obtained in the continuous assessment will be maintained and the opportunity to recover 75% of the grade of the module deliveries. |
| **References**<br>(max. 3 that are key for the programme/project) | The necessary documentation to work the subject will be available on the Internet. In particular:<br>- Java Platform, Standard Edition 6 API Specification (http://download- |

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| | llnw.oracle.com/javase/6/docs/api/index.html)<br>- Java SE 6 Documentation (http://download-llnw.oracle.com/javase/6/docs/api/index.html)<br>- The Java Tutorials (http://download-llnw.oracle.com/javase/tutorial/index.html) |
| **Hardware and software required** | Eclipse and Visual Editor |
| **Webpage** | N/A |

# Annex 51

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Programming III |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Andoni Eguiluz |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | *Lectures* - The teacher presents topics in lectures with a support by audiovisual technique (transparency & video projectors, Internet). Questions are made in such way in order to increase student participation.<br>*Homework* - Guided study. The teacher uploads reference documentation and source code to be analyzed to complete the understanding of the different concepts studied in the subject.<br>*Practical work*. The teacher with small groups of students proposes simple exercises to be performed with the editor and Java compiler. It is given time for students to experience based on a given guidance and to achieve the objectives of each practice. It is done in class and is also possible to continue and complete work at home.<br>*Homework* – Module development. Analysis of the computer problem working on a solution proposed according to a given model, and development of appropriate modules using the Java programming language.<br>*Homework* – Project development. Computer problem analysis, integration and implementation of modules developed and completion of remaining modules using the Java programming language. Testing and debugging the obtained code for the final delivery.<br>*Computer room* – Project validation. Installation of the project work, brief statement of its performance to the teacher, answering questions and solving minor modifications requested by the teacher. |
| **ECTS** | 6 |
| **Level** | 2nd course of a Bacherlor's degree in Computer Engineering |
| **Prerequisite(s)** | Skills developed in the first two programming courses needed (Programming I and Programming II). |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | This subject contributes to the training in Computer Engineering at the important skill of programming as a third sequential approach subject within the whole area. |
| **list/enumeration of themes/topics that** | Theoretical content<br>1. Introduction. (3 h) |

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| **should be mastered during the course** | Concepts of OOP. Inheritance, polymorphism, interfaces and composition. Unit testing: JUnit.<br>Item 2. Planning. (2 h)<br>General concepts of planning. Approach small programming project, according to project model.<br>Item 3. API. (1 hour)<br>Review Java API. Major packages and classes.<br>Item 4. Data Access and Databases (3 h)<br>External data access from Java. Serialization files. Databases. JDBC.<br>Item 5. User Interface Design (3 h)<br>Advanced Swing: JTable, JTree. Renderers and Editors. Introduction to JavaFX.<br>Item 6. Java for Android (4 h)<br>Development environment. Project structure. Components of an Android application and user interface.<br>Item 7. Data Structures. (4h)<br>Construction of trees and graphs. Algorithmics travel, sorting and searching. complex structures with Java Collections.<br>Item 8. Design Patterns (3 h)<br>Introduction to patterns. Singleton. Factory. Observer. Using patterns in the project.<br>Item 9. Debugging and efficiency analysis. (2 h)<br>Program debugging tools. Code analysis. Analysis of running programs.<br>Item 10. Integration and Development Tools. (3 h)<br>Integration with Ant. Shared Edition with SVN / GIT. Version management. Task management, improvements and errors.<br>Practical content<br>Pr1 practice. Tests. (4h)<br>Test sample programs in Java.<br>Pr2 practice. Pilot project (4 h)<br>Review of the subject pilot project. Working model. Test execution. Unit tests and functional. Code documentation. Standards writing code.<br>Pr3 practice. Files and Databases (4 h)<br>Using files and simple databases in Java.<br>Pr4 practice. Swing (4 h)<br>Swing improvement defined interfaces.<br>Pr5 practice. JavaFX (4 h)<br>Enriched UIs with JavaFX.<br>PR6 practice. Android (8 h)<br>First programs with Java for Android.<br>PR7 practice. Data Structures and Algorithms (4 h)<br>Using complex data structures. Development and evaluation of algorithms. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | According to the map of competences of the degree, Generic Competence 10.1 is developed. Planning Level 1. Design modules to develop them according to the time and resources |

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| | available for a small project, and plan implementation. Establish a general plan for provided tasks. A thorough and methodical plan is established, and subjected to a certain logic. This approach treats to minimize or eliminate potential disadvantages or risks that can arise when we decided to undertake a task. And also it serves to develop, supervise and conduct the fulfillment of that task.<br>In this subject that competence is developed in its first level domain, related to organizing daily personal work, resources and time with methods according to the possibilities and existing priorities.<br>Additionally, the following four specific competences are worked:<br>SPECIFIC COMPETENCE CE1. Design classes and algorithms using the Java language to solve, test and debug the code performed until proper operation.<br>SPECIFIC COMPETENCE CE2. Develop code using low-level tools (text editor, compiler, command line) and high (integrated development environment with visual editor windows) environment.<br>SPECIFIC COMPETENCE CE3. adequately integrated some application development elements with certain encoding complexity: Java Collections, composite structures data, databases and files, patterns basic design, user interfaces developed.<br>SPECIFIC COMPETENCE EC4. Identify inefficiency areas in a program to find the optimal solution. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | In the course a programming mini-project will be done according to a model project worked in class and that will be used as reference. This project will be addressed in successive deliveries along the subject, and a final delivery at exam time.<br>CONTINUOUS EVALUATION ACTIVITIES (22.5% of the grade)<br>Five collection corresponding to the evolution of the project deliveries with delivery dates limits for each of them (throughout the development of the course):<br>- E1. Report: Proposal Planning (2.5%)<br>- E2. Project first phase (6%)<br>- E3. Project, second phase (6%)<br>- E4. Project, third phase (6%)<br>- E5. Development Report (2%)<br>GLOBAL ASSESSMENT ACTIVITIES (77.5% of score)<br>There will be three global assessment activities at the end of |

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| | the semester:<br>- E6. Programming project (final delivery).<br>- E7. Final exam: Machine test solving exercises and global issues in computer room.<br>- E8. Project individual validation in computer room: Check tracking code and test slight modification of the project done.<br>No cutoffs in any of the evaluation activities, or required to overcome independently planning generic competition.<br>Students who fail the continuous assessment have the opportunity to recover 75% of the grade of the module deliveries (E1 to E4) in project delivery.<br>Looking ahead to the extraordinary assessment, the mark obtained in the continuous assessment will be maintained and the opportunity to recover 75% of the grade of module deliveries. |
| **References**<br>(max. 3 that are key for the programme/project) | The necessary documentation to work the subject will be available on the Internet. In particular:<br>- Java Platform, Standard Edition 6 API Specification (http://download-llnw.oracle.com/javase/6/docs/api/index.html)<br>- Java SE 6 Documentation (http://download-llnw.oracle.com/javase/6/docs/api/index.html)<br>- The Java Tutorials (http://download-llnw.oracle.com/javase/tutorial/index.html) |
| **Hardware and software required** | Eclipse |
| **Webpage** | N/A |

# Annex 52

**Name of provider / GameHub partner institution / country:**

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| **Title** | Programming IV |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Asier Perallos |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The required dedication is 150 hours, which are distributed by the following scheme:<br>Classroom activities (40%):<br>+ Lectures for knowledge transfer and activation of cognitive processes of the student.<br>+ Test exercises and practice of previously acquired knowledge.<br>+ Practical classes in laboratories proposed by the teacher, where the knowledge adquired in other activities performed in the classroom will be implemented.<br>+ Individual study of the collected material during the activities carried out in the classroom, and solving the proposed tasks to achieve autonomous and significant learning and to complete the preparation of objective and written tests.<br>+ Project-based learning in which the student applies the knowledge and skills acquired through realization of a team practice. |
| **ECTS** | 6 |
| **Level** | 2nd course of a Bacherlor's degree in Computer Engineering |
| **Prerequisite(s)** | Basic use of programming languages and other artificial computer languages (Programming I, Programming II, Programming III). |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | One of the most commonly used languages today is the C / C++ language, one of the key languages for the success of object-oriented programming. Many applications, including operating systems, are developed in this language. The computer engineer must know the basics of the language and be able to develop applications using its features. |
| **list/enumeration of themes/topics that should be mastered during the course** | UNIT 1 STRUCTURED PROGRAMMING. C. History. Conceptual differences with Java. The process of object code generation in C: the preprocessor, compiler and linker. Setting up a project in C. C programming model: data types, structures, statements, control structures, functions.<br>UNIT 2. POINTERS. Declaration. Uses. Arrays. Strings. dynamic memory management. pointers to functions.<br>UNIT 3. OBJECT-ORIENTED PROGRAMMING IN C ++. Evolution from structured programming. Encapsulation. |

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| | Builders. Destroyers. Static members. Copy constructor and assignment operator. Operator overloading. Heritage. Polymorphism.<br>UNIT 4. DATA PERSISTENCE. Utilities access to relational databases in C ++. managing classes data access.<br>UNIT 5. TEMPLATES. Declaration. Uses. Data structures and algorithms of the STL library. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | GENERIC COMPETENCE 6: CG6.1. Teamwork: Integrate and collaborate actively in achieving common goals with other people, areas and organizations. Level 1: Participate and collaborate actively in the team tasks and generate confidence, cordiality and orientation to the joint task.<br>SPECIFIC COMPETENCE CE1. Apply the basics of structured programming and object-orientation of the languages C and C / C ++ in solving computer problems.<br>SPECIFIC COMPETENCE CE2. Analyze requirements, problem and solution design and develop a functional, flexible and robust computer team using the required characteristics of C / C ++ language. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | Generic and specific competences will be assessed by two instruments:<br>CORE PRACTICE. Development of a functional computer application in C / C ++ language, including requirements analysis, design and implementation. Made in team. It constitutes 40% of the qualification subject.<br>EXAM. Two tests focused on the programming language C / C ++ consisting in:<br>+ EX1.- Initial test of computer solving exercises and problems with language C. (30%)<br>+ EX2.- Computer exercises and solving global problems at the end of the semester. (30%)<br>Generic competence CG6 (10%), and specific CE2 (30%) will be evaluated, both entirely through the practice. The specific competence CE1 (60%) will be evaluated through examination. Since learning a programming language is cumulative, students may recover in the last exam (EX2) till 75% of the score that is not achieved in the first (EX1). |
| **References**<br>(max. 3 that are key for the programme/project) | + Deitel, 2003. Fourth Edition. C ++ Programming. Pearson.<br>complementary:<br>+ Bjarne Stroustrup, 2002 Special Edition. The C ++ Programming Language. Addison Wesley.<br>+ B.W. Kernighan and Ritchie M. D., 1989. The programming language C. Prentice Hall. |

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| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 53

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Intelligent Systems |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Enrique Onieva |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The course includes the following activities:<br>- Presentation and debate<br>- Solving exercises, problems and cases.<br>- Group projects applying the case solving method.<br>- Programming tasks<br>- Personal reading and study<br>The course requires 150 hours of student work distributed throughout the semester and the examination period. The expected student work time in and out of the classroom is as follows:<br>- Work in the classroom: 62,5 hours<br>- Work outside the classroom: 87,5 hours |
| **ECTS** | 6 |
| **Level** | 3rd course of a Bacherlor's degree in Computer Engineering |
| **Prerequisite(s)** | UML notation for the design of class diagrams.<br>Algorithmics, data structures and object oriented programming.<br>JAVA programming language. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The main contribution of the subject Intelligent Systems is in problem solving and application design according to given requirements and applying the specified criteria of effectiveness, efficiency cost and benefit.<br>A game design requires designing and using heuristics for artificial intelligence algorithms, and developing knowledge based systems. |
| **list/enumeration of themes/topics that should be mastered during the course** | Chapter 1. What is Artificial Intelligence?: Definitions of Artificial Intelligence. The Foundations of Artificial Intelligence.<br>Application areas of Artificial Intelligence. Abridged history of Artificial Intelligence.<br>Chapter 2. Intelligent Systems: The Concept of Rationality. Problem Environment. Properties of problem environments. Problem environment and performance measure. Types of problems addressed by Intelligent Systems.<br>Chapter 3. Search and Heuristics: Solving problems by search techniques. Uninformed, or blind, search. Informed, or heuristic, search. How to define good heuristics and their application. Local search. On-line search. Adversarial Seach. |

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| | Constraint Satisfaction Problems.<br>Chapter 4. Machine Learning: The definition of learning within the Artificial Intelligence context. Supervised Learning.<br>Regression and Classification. Linear Regression. Decision Tree Learning.<br>Chapter 5. Knowledge Based Systems: Knowledge representation. Knowledge representation techniques. Inference and reasoning. Development of knowledge based systems that combine objects and rules. Forward chaining rule systems.<br>Backward chaining rule systems. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | Generic Competency CG9.2 Problem Solving: To identify, analyze and define the significant elements making up a problem in order to solve it with criteria and effectively.<br>Level 2: To use one's own experience and criteria in the analysis of the causes of a problem and build up a more effective and efficient solution.<br>Specific Competency CE1: To formulate search problems and to identify and apply an appropriate solving technique.<br>Specific Competency CE2: To define and apply good heuristics to solve different problems considered difficult.<br>Specific Competency CE3: To apply machine learning techniques as a way for an intelligent system to gain a certain degree of autonomy.<br>Specific Competency CE4: To analyze problems whose resolution requires empirical knowledge and to design knowledge based systems. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | The student's final mark is the result of adding the following partial marks:<br>- Evaluation of every group project submission (35% of the final mark)<br>- Evaluation of the exam to test minimum necessary knowledge (60% of the final mark)<br>- Evaluation of individual activities. (5% of the final mark)<br>Following is a summary of the evaluating scheme relating the competencies to be developed with the different activities to be evaluated:<br>Generic Competency (6% of the final mark)<br>Group project 2: 6%<br>Specific Competency CE1 (33% of the final mark)<br>Group project 1: 13%<br>Test for minimum required knowledge: 20%<br>Specific Competency CE2 (28% of the final mark) |

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| | Group project 1: 10%<br>Individual work: 3%<br>Test for minimum required knowledge: 15%<br>Specific Competency CE3 (12% of the final mark)<br>Test for minimum required knowledge: 10%<br>Individual work: 2%<br>Specific Competency CE4 (21% of the final mark)<br>Group project 2: 6%<br>Test for minimum required knowledge: 15%<br>Students must complete every learning activity. In the case they don't succeed to meet a given deadline, they can make a postponed submission subject to a penalization as described below.<br>Before adding a student's partial marks to compute their final mark, the following conditions are verified::<br>- For every evaluated activity, a student must obtain a mark above the specified minimum threshold.<br>- For the generic competency, a student must obtain a mark above the specified minimum threshold.<br>After deadlines of group activities, there is the possibility of a delayed presentation of each one of the group works. The delayed presentation will be associated with a cut in the rating proportional to the time of the delay. It will also be posible to recover up to 75% of the rating associated with the continuous evaluation activities.<br>With respect to the extraordinary call, the same rating scheme is maintained except in the case of students who have not done any of the group activities for the ordinary call. In such cases, the group activities will be replaced by individual activities with the same learning objectives. |
| **References**<br>(max. 3 that are key for the programme/project) | Russell, S. & Norving, P. Artificial Intelligence: A modern approach. 3ª Ed. Prentice-Hall. 2010. |
| **Hardware and software required** | Eclipse |
| **Webpage** | N/A |

# Annex 54

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Software Requirements |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Rebeca Cortazar |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The teaching-learning strategy will be implemented by means of the following methods and techniques:<br>- *Lectures*: Driven by the professor, who will introduce the contents listed in the subject syllabus in a detailed and structured way in the classroom. Lecture materials, to be used during the lessons, will be previously available for students to read them in advance (chapters of books, scripts, papers and/or slides), organized by units.<br>- *Colaborative work*: Scheduled Classroom and Out-of-Classroom activities, in work groups and discussions about several topics.<br>- *Directed Self-study*: Understanding and synthesis of basic theoretical concepts, by means of directed self-study out-of classroom activities.<br>- *Case Study*: Development of two case studies; the first one will be focused on the elicitation, analysis and validation of requirements; the second one will concentrate on the modelling of requirements. Alternatives will be considered with the aim of training critical thinking and fostering discussions in the classroom. The most suitable alternative will be selected, depending on the context of the problem.<br>- *Teamwork*: Students, in groups, will face a problem in an organization; the goal will be to obtain, analyse, validate and model the requirements of a software solution that solves the organization problem, and produce the system requirement specification.<br>According to the allocated 6 ECTS, the required time committment for fulfilling this subject requirements is 150 hours,<br>which will be distributed in agreement with the following working hours:<br>* Work in the classroom: 50 hours<br>* Work outside the classroom: 100 hours |
| **ECTS** | 6 |
| **Level** | 2nd course of a Bacherlor's degree in Computer Engineering |
| **Prerequisite(s)** | None. |
| **Overall description + Relation to Game** | One of the main tasks of graduates in Computing Engineering is the development of tools or software |

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| **Industry**<br>(max. 2.500 characters) | solutions. If the life cycle of a software system development process is analysed, the first step will always be the definition of what this system/tool is supposed to be; those who better know what they want are the system stakeholders, those who are affected by the prospective system. In this subject, students will gain the needed competences for the definition and modelling of a system in an organized and systematic way, as well as the techniques for gathering the required information from the stakeholders. |
| **list/enumeration of themes/topics that should be mastered during the course** | 1. Software Engineering: Definition. Phases. Process Models. RUP.<br>2. Software Requirements. The Concept of Requirement. Requirements Engineering. Requirements Elicitation. Requirements Analysis, Negotiation and Prioritization. Software Requirement Specification and standards. Requirements<br>Validation. Interviewing and Data-Gathering Techniques.<br>3. Modelling. Principles of Modelling. UML. Object Oriented Analysis. Use Cases and Additional diagrams. Conceptual<br>Domain Model.<br>4. Towards Design. Logical Architecture and Object Oriented Design. Design Class Diagram. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | - GENERIC COMPETENCE GC5.1. Interpersonal Communication: Interacting positively with other persons through empathetic listening and through clear, assertive expression of what one thinks and/or feels, by verbal and non-verbal<br>means. Level 1: Establishing good dialogue with classmates and lecturers, listening and speaking clearly and assertively.<br>- SPECIFIC COMPETENCE SC1: Assess the pertinence of different Software Engineering Process Models, given a particular domain.<br>- SPECIFIC COMPETENCE SC2: Select and apply the appropriate techniques for the elicitation, analysis, negotiation and validation of requirements, given an information system with a specific difficulty.<br>- SPECIFIC COMPETENCE SC3: Elaborate the set of models of a system, as part of its requirement specification, evaluating its level of compliance with the basic attributes of a well-written requirement specification.<br>- SPECIFIC COMPETENCE SC4: Refine the requirement models of a given system, transitioning from analysis to design. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |

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| **Evaluation/Grading basis/Form of control** (exams, project work, …) | * Generic Competence: 10% of the final grade<br>- Assessment of Classroom Activities (by the professor): 5%<br>- Assessment of Out-of-Classroom Activities (peer assessment): 5%<br>* Specific Competences: 90 % of the final grade.<br>- Knowledge test: 30%<br>- Classroom and Out-of-Classroom Activities: 20%<br>- Teamwork: 40%<br>In order to pass the subject, at leat 4 points out of 10 must be earned in each of the evaluation items: in the Knowledge test, in the grade of the activities and in the teamwork. |
| **References** (max. 3 that are key for the programme/project) | * Ian Sommerville, Software Engineering, Addison Wesley, ISBN: 8478290745.<br>* Suzanne Robertson, James Robertson, Mastering the Requirements Process. Addison-Wesley Professional, ISBN: 0321419499.<br>* Craig Larman, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative<br>Development, Prentice Hall, ISBN: 978-0131489066. |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 55

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Software Design |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Rebeca Cortazar |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The teaching-learning strategy will be implemented by means of the following methods and techniques:<br>- *Lectures*: Driven by the professor, who will introduce the contents listed in the subject syllabus in a detailed and structured way in the classroom. Lecture materials, to be used during the lessons, will be previously available for students to read them in advance (slides, scripts, web links, etc.), organized by units.<br>- *Case Study*: Development of case studies, in order to assess alternatives and discuss design options. The most suitable alternative will be selected, depending on the context of the problem. During the development of those case studies, the notation of UML Sequence, Component and Deployment diagrams will be introduced.<br>- *Personal Experimentation*. Students will be provided with small problem statements so they can practice their modeling skills. On the other hand, lab sessions will be conducted in order to run basic RMI and JDO working examples, as well as get first-hand experience about design pattern implementation examples.<br>- *Teamwork*: Given a requirement specification, students will be requested to design a software solution based in patterns. They will have to use the UML notation to communicate and document their design and they will have to implement it using distributed technologies, RMI in particular, and use JDO for persistence.<br>According to the allocated 6 ECTS, the required time commitment for fulfilling this subject requirements is 150 hours, which will be distributed in agreement with the following working hours:<br>* Work in the classroom: 50 hours (lectures: 33 hours; labs: 17 hours)<br>* Work outside the classroom: 100 hours (teamwork: 68 hours, personal preparation: 26 hours, group support: 2 hours, assessment: 4 hours) |
| **ECTS** | 6 |
| **Level** | 3rd course of a Bacherlor’s degree in Computer Engineering |
| **Prerequisite(s)** | Basic skills about thinking in objects, skills about |

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| | programming using Java and basic concepts about RDBS. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | One of the key roles of graduates in Computing is the design and implementation of software solutions. If we analyse the life cycle of a software system, the second fundamental step is the design of the product to be built. In this course, students acquire the skills necessary for the design of distributed object-oriented software solutions, using UML as modeling notation and applying well-known design patterns, as well as heuristics and best practices. Therefore, this subject's contribution to the professional profile (from a competence perspective) is related to problem solving skills and system, component and application design, using a systemic approach (as well as creative and innovative), starting from existing requirements and taking into consideration different criteria for the evaluation of alternative solutions. |
| **list/enumeration of themes/topics that should be mastered during the course** | 0. About Teamworking. Group Dynamics and Effective Teams. Roles in a Team. Conflict Management.<br>1. Architecture and UML Modeling. The Design stage in the Software Development Life Cycle. Concept of Architecture and Components. UML Component and Deployment diagrams notation.<br>2. Client-Server Applications. Characteristics. Distributed Objects: RMI. Persistence and Object-Relational Mappers: JDO.<br>3. Design Heuristics, Best Practices and UML Modeling. Design principles, Riel´s Heuristics, GRASP Patterns, Best Practices and Refactorings. UML Sequence Diagrams.<br>4. Design Patterns. Enterprise Application Patterns, GoF Patterns, MS and J2EE Patterns. Antipatterns. |
| **Competences/Learning objectives** (max. 1.500 characters) | GENERIC COMPETENCE GC6.2. Teamwork: Actively joining and participating in the attainment of shared objectives with other persons, departments and organisations. Level 2: Contributing to the consolidation and development of the team, fostering communication, balanced distribution of work, good team atmosphere and cohesion.<br>SPECIFIC COMPETENCE SC1. Design and evaluate alternative solutions to a software problem, applying patterns and design best practices.<br>SPECIFIC COMPETENCE SC2. Document software designs, correctly using suitable UML diagrams and notation.<br>SPECIFIC COMPETENCE SC3. Implement a software design, based on patterns, using distributed technologies. |
| **Outcomes** (max. 1.500 characters) | N/A |
| **Assignments** (example if available) | N/A |

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| **Evaluation/Grading basis/Form of control** (exams, project work, …) | * Generic Competence: 10% of the final grade<br>- Peer-to-Peer Assessment (teamwork): 10%<br>* Specific Competences: 90 % of the final grade.<br>- Knowledge test: 40%<br>- Teamwork: 50%<br>In order to pass the subject, at leat 4 points out of 10 must be earned in each of the evaluation items: in the Knowledge test and in the teamwork coursework.<br>Up to 75% of the continuous assessment grade can be re-earned before the first grading period. The same assessment scheme will be applied for the resits. |
| **References** (max. 3 that are key for the programme/project) | * Gamma et al., Design Patterns: Elements of Reusable Object-Oriented Software. Addison-Wesley Professional, ISBN-13: 978-0201633610.<br>* A. Riel, Object-Oriented Design Heuristics, Addison-Wesley Professional, ISBN-13: 978-0201633856.<br>* Craig Larman, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, Prentice Hall, ISBN: 978-0131489066. |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 56

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Software Process and Quality |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Diego Lopez de Ipiña |
| **Language** | English |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The main methods and techniques used in the subject are summarized, contextualising the teaching strategy:<br>+ *Lecture*. Presentation of the subject contents in a detailed and organised manner in the lecture room. The contents, used in the lessons, will be made available to students (in the form of slides, tutorials, web pages and so on), classified by module.<br>+ *Personal experimentation*. The software development management methodologies and tools will be put in practice in the laboratory lessons. They will be guided by the lecturer. Tools will be installed and configured, practical examples will be shown and explained following a "learning by example" strategy.<br>+ *Teamwork*. Given a requirement specification proposed by the students and validated by the lecturer, these will have to accomplish the development of a whole software project, following the whole lifecycle of a software development process, applying an agile methodology, and using the set of support tools for development and quality assurance studied in the subject.<br>According to the 6 ECTS assigned to the subject, the time investment required to follow-up the subject and fulfil its requirements is 150 hours, which will be allocated according to the following estimated working times:<br>+ Work within the lecture room: 50 hours<br>- Lecture: 19 hours<br>- Practical activities guided by the lecturer: 9 hours<br>- Collaborative activities supervised in lecture room: 22 hours<br>+ Work outside the lecture room: 100 hours<br>- Individual work (including time invested preparing the knowledge test): 50 hours<br>- Teamwork: 44 hours<br>- Evaluation (Knowledge Test + Assignment Presentation): 6 hours |
| **ECTS** | 6 |
| **Level** | 3rd course of a Bacherlor’s degree in Computer Engineering |
| **Prerequisite(s)** | Knowledge of software specification, design and |

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| | implementation techniques. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The graduates of Computer Engineering from University of Deusto have to be able to undertake the development of a software project in an efficient, effective and quality manner. For that, it is paramount to know the existing software development methodologies and their real applicability to concrete software projects. Besides, it is important to guarantee the maximum quality of the software resulted from that development process. In this subject, the skills to apply an agile software development methodology to the needs of a project are obtained. The students learn and put in practice the software development process management tools that ease their work and coordination with other software developers also taking part in a software project. Among others, the student acquires skills to employ software configuration tolos (construction, change control, version control), tests and quality assurance, and software development management (documentation and error management). |
| **list/enumeration of themes/topics that should be mastered during the course** | MODULE 0. SOFTWARE PROJECT MANAGEMENT. Planning techniques. Planning models and methodologies. Task priorization and re-planning. Tools to support planning.<br>MODULE 1. SOFTWARE DEVELOPMENT PARADIGM. Traditional and agile methodologies. Samples of application of different software development models. Maturity model CMMi. Software Product Line. Agile Manifesto. eXtreme Programming. Test-Driven Development. SCRUM. SCRUM application to software development process.<br>MODULE 2. SOFTWARE CONFIGURATION MANAGEMENT. Software Configuration Management (SCM) concept.<br>Software construction and automation. Software construction and automation tools: Maven. Software change and versión control. Software change and version control (SVN, GIT).<br>MODULE 3. SOFTWARE DEVELOPMENT MANAGEMENT. Technical documentation. Automatic documentation generation tools: DOxygen, javadoc. Error and incidences management systems. Code debugging tolos: SLF4J and log4j.<br>Error and issue management systems. Project management and issue tracking tools, e.g. YouTrack..<br>MODULE 4. TESTING AND QUALITY ASSURANCE. Software quality measures and factors. Testing types and levels: unity, performance and integration. Continuous integration (Jenkins). Testing frameworks: Cobertura, JUnit, Contiperf, Mockito and profiling tools. Different testing techniques use and comparison. |
| **Competences/Learning objectives** (max. 1.500 characters) | After completing the subject, the student will have acquired and exercised the following skills/competences:<br>GENERIC COMPETENCE GC10.2. Planning. Deciding |

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| | effectively the objectives, priorities, methods and controls for work to be done, by organising tasks within deadlines and available means. Level 2. Taking part and getting involved in the organised undertaking of group work, foreseeing the tasks, times and resources needed to achieve desired results.<br>SPECIFIC COMPETENCE EC1. Apply an agile software development model in the construction of a software solution.<br>SPECIFIC COMPETENCE EC2. Make use of tools to manage the software configuration process.<br>SPECIFIC COMPETENCE EC3. Make use of tools to manage the software project development.<br>SPECIFIC COMPETENCE EC4. Deploy tools for software quality assurance. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | The generic and specific competences will be assessed by means of two instruments:<br>+ TEAMWORK: a complete software project will be developed by the students following an agile software development methodology. It will be carried out in teams of 4 people preferably. The usage of software development support tolos studied in the subject will be documented. A final compulsory submission will be assessable. The teamwork will count for 7.5 points.<br>+ KNOWLEDGE TEST: a unique knowledge test, in the form of short questions, will be used to assess either the practical or theoretical contents. It will be granted 2.5 points.<br>The grading system, bearing in mind the generic and specific competences, is as follows:<br>+ GENERIC COMPETENCES = 10%, derived from team work<br>- Team mate evaluation = 5%, Lecturer evaluation = 5%<br>+ SPECIFIC COMPETENCES = 90 %<br>- Knowledge test = 25%<br>- Team work = 65%<br>From the point of view of the activities carried out, next, how they are assessed and their grading proportion are detailed:<br>+ TEAM WORK = 75%<br>- 5% Team mate evaluation<br>- 50% Project evaluation by lecturer<br>- 20% Individual contribution to project evaluation by lecturer<br>+ INDIVIDUAL WORK = 25% (Knowledge test)<br>To pass the subject is necessary to obtain at least 4 over 10 in the knowledge test and 5 over 10 in the team work |

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| | assignment. Students who do not have access to an assessment carried out by their team mates in the project will not opt to such part of the qualification. |
| **References** (max. 3 that are key for the programme/project) | N/A |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 57

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Advanced Software Development |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Diego Lopez de Ipiña |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The main methods or techniques that materialize the teaching strategy used during the course are summarized:<br>+ *Lecture*. Presentation by the teacher of the contents contained in the syllabus of the course detailed and organized in the classroom. The materials, available for the clases, previously will be available for the students (as transparencies, tutorials, web pages, etc), classified by chapters.<br>+ *Self Experimentation*. Studied prototypes and software development languages will have a part of practical reinforcement in laboratory classes. There will be two types of laboratory classes. The guided by the teacher which will show practical examples, following a strategy of "learning by examples". Those made by the student from activities and exercises proposed by the teacher to reinforce student learning. They will be corrected in the own laboratory sessions. In addition, students must make an individual project to implement key technologies<br>+ *Individual project*. Students must take an individual project to implement major studied technologies applied to a novel field as web programming, social networks and Big Data.<br>According to the 6 ECTS assigned, dedication required to track the subject and compliance with its requirements is 150 hours, which will be distributed according to the following estimated times work:<br>+ Work in the classroom: 52 hours<br>- Exposition: 21 hours<br>- Practical activities guided by professor: 9 hours<br>- Individual Supervised activities in the classroom: 22 hours<br>+ Work outside the classroom: 98 hours<br>- Individual work (including study for the knowledge test): 48 hours<br>- Development of individual project: 44 hours<br>- Evaluation (Knowledge Test + Presentations individual project): 6 hours |
| **ECTS** | 6 |
| **Level** | 4th course of a Bacherlor’s degree in Computer Engineering |
| **Prerequisite(s)** | Notions of design and implementation of software projects, |

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| | web programming and data access. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Graduates in Computer Engineering from the University of Deusto should be aware of latest trends in programming in terms of paradigms and languages.<br>The purpose of this course is to train the student on the latest trends in paradigms and programming languages that enable an effective way to successfully undertake projects that solve challenges. |
| **list/enumeration of themes/topics that should be mastered during the course** | TOPIC 0. LATEST TRENDS IN SOFTWARE PROGRAMMING. Advanced features of Java 8.0. Code annotation. Programming Paradigms: aspects orientation, functional programming languages scripting.<br>ITEM 1. ASPECT ORIENTED PROGRAMMING. Introduction: characteristics and purpose. applicability to business software solutions. AspectJ development framework. Integration-oriented programming and object-oriented aspects.<br>ITEM 2. SCRIPTING LANGUAGES. Main purpose and evolution over time. Major scripting languages: JavaScript and Python. Applicability of scripting languages. Integration with compiled languages.<br>ITEM 3. JAVASCRIPT. Node.js JavasScript programming general purpose language. Advanced aspects: integration with other programming languages, object serialization (JSON) and AJAX, evently, mustache, jQueryy AngularJS. Server side programming with node.js and Express. Programming a social networking application with JavaScript and HTML5.<br>ITEM 4. PYTHON AND OTHERS. Key features: syntax and applicability. General purpose programming with Python. Programming web applications on non-relational data bases with MongoDB and Flask. |
| **Competences/Learning objectives** (max. 1.500 characters) | Upon completion of this course, the student must have acquired and exercised the following competences:<br>GENERIC COMPETENCE CG9.2. Problem resolution. CG9.2. Use your experience and judgment to analyze causes of a problem and build a more efficient and effective solution.<br>SPECIFIC COMPETENCE CE1. Select the paradigm or the combination of more programming paradigms appropriate to address scheduling a next-generation software solution.<br>SPECIFIC COMPETENCE CE2. Use scripting languages in enterprise software programming solutions contemporary.<br>SPECIFIC COMPETENCE CE3. Develop web applications that access and process huge volumes of data emerging through last generation languages. |
| **Outcomes** (max. 1.500 characters) | N/A |

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| **Assignments** (example if available) | N/A |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Generic and specific competences will be assessed by two instruments:<br>+ INDIVIDUAL PROJECT: A complete software project will be developed by the student applying studied development technologies. Used tools will be documented. It provides for a final, binding and evaluable delivery. The work will be evaluated on 7.5 points.<br>+ TEST OF KNOWLEDGE: A single proof of knowledge, in the form of short questions, where they will assess both theoretical contents of the subject and practical. It will be evaluated on 2.5 points. The grading system is as follows, from the point of view of the generic and specific competencies:<br>+ GENERIC COMPETENCES = 10%, derived from the individual project<br>- Evaluation by teacher = 10%<br>+ SPECIFIC COMPETENCES = 90%<br>- Knowledge test = 25%<br>- Single Project = 65%<br>From the point of view of the activities performed, the instrument and percentage of assessment is as follows:<br>+ INDIVIDUAL PROJECT = 75%<br>- 75% Project assessment by the teacher<br>+ INDIVIDUAL WORK = 25% (Knowledge test)<br>To pass the course the student must get at least 4 out of 10 in the knowledge test and a 5 out of 10 the individual project. |
| **References** (max. 3 that are key for the programme/project) | N/A |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 58

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Software Project Management |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | María Asunción Barredo |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | In this course, much of the effort is devoted to obtaining the computer-project objective document.<br>The main methods or techniques that materialize the teaching strategy used during the course are summarized:<br>- *Lecture*. Presentation by the teacher of the contents contained in the syllabus of the course detailed and organized in the classroom. The materials, available during clases, will be previously available for the students (as transparencies, tutorials, web pages, etc), classified by chapters.<br>- *Personal activities*: objective document creation.<br>- *Exercises* in the classroom and outside the classroom: risk assessment, scheduling, project tracking.<br>- *Activities in the classroom*: risk projection<br>- *Guided Study*: compression and synthesis of the basic theoretical concepts in the form of self-study activities directed to be held outside the classroom.<br>According to the 6 ECTS assigned, dedication required to track the subject and compliance with its requirements is 150 hours, which will be distributed according to the following estimated times of work:<br>- Work in the classroom: 40 hours<br>- Work outside the classroom: 110 hours |
| **ECTS** | 6 |
| **Level** | 4th course of a Bacherlor's degree in Computer Engineering |
| **Prerequisite(s)** | None. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Software Project Management course provides an overview of everything that refers to organization, management and IT project management. It also explains the activities and basic techniques that establish a formal system of planning information systems. To achieve all this is explained how to communicate correctly in various writings and describes a common language that allows direct communication and unequivocal among project participants. |
| **list/enumeration of themes/topics that should be mastered during the course** | 1. Project management process. Project management. Activities of project management. User participation. Manager of the project. Project Organization.<br>2. Definition of project objectives. Purpose of the formal definition of objectives. Preparation of an objective |

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| | document. Guidelines for products. Definition of termination criteria. Documents under the control of changes.<br>3. Planning and project schedule. Estimate. The risk: identification and assessment. Defining a plan: products, tasks, human resources. organizational planning. Preliminary schedule. Project Schedule Determination and balance of resources. Workplan. Parallelism. Distribution efforts. Budget. The software project plan. Automated tools support the conduct of projects.<br>4. Monitoring, control and closure. Purpose and frequency of monitoring. Progress information. Estimate to complete. Status report. Information finished project. Guidelines. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | GENERIC COMPETENCE CG3. Written communication. Interact effectively with others through explaining what you think and / or feel, through writing and graphics support expression. Level 2. Communicate with ease in writing, structuring text content and graphics support to facilitate the understanding and interest of the reader on writings.<br>GENERIC COMPETENCE CG10. Planning. Effectively determine the objectives, priorities, methods and controls to perform tasks by organizing activities with deadlines and available means. Level 3. Methods and skills to plan the development of a complex project (For example: End of degree project).<br>SPECIFIC COMPETENCE CE1: design, develop, document and evaluate specific solutions, integrated information technology and communications in any domain that requires taking into account social considerations, economic and business ethics affecting the practice of engineering.<br>SPECIFIC COMPETENCE CE2: manage projects in the field of ICTs, management techniques within knowledge and understanding of the commercial and economic context of the processes of engineering, orientation quality and innovation. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | -Objective document creation |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | * Generic competences: 20% of grade<br>o Objectives Document: 20%.<br>* Specific competences: 80% of the note.<br>o Knowledge test: 40%<br>o Classroom activities: 10%<br>o Objectives Document: 30%.<br>Summarizing:<br>* Document Objectives: 50%<br>* Knowledge Test: 40%<br>* Activities: 10% |

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| | To pass the course is necessary to obtain a 3 out of 10 in the Objectives Document and Knowledge Test. |
| **References** (max. 3 that are key for the programme/project) | - Guide the basis for project management (PMBOK Guide). Project Management Institute. 4th ed, 2009.<br>- Prince2. http://www.prince2.com/. Last query: 2012/06/01 |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 59

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Interactive multimedia and videogames |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Andoni Eguiluz |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The course uses in an integrated manner the following strategies of teaching / learning:<br>+ EXPLOITATION AND DEBATE. The teacher presents topics in classroom lectures supported by audiovisual methods (overhead projector, video projector, Internet). Questions are made to increase student participation.<br>+ GUIDED STUDY. The teacher provides references and analyzes sources to complete the understanding of the different concepts studied in the subject code. He will also propose a number of topics that each student will choose to research, develop and deliver individually. This work is afordable in English, being valued additionally.<br>+ PRACTICAL WORK. In some of the contents, the teacher proposes simple exercises to do with the programming language that each student choose. Students will experience basing on a given guide for achieving the objectives of each practice. The result of practical work may be used in the project.<br>+ DEVELOPMENT PROJECT. The student will choose a working group from two to four people and will design, develop, test and finally distribute a video game or interactive multimedia application. They can choose any development environment although they are invited to do it in Java (for PC or mobile platform Android) or HTML5 + JavaScript (for any environment).<br>PROJECT EXHIBITION. Each project group will make a public statement defending their work. They may be asked by the teacher about specific aspects, both the design and functionality or technical parts of the development. The documentation, such as presentation material, such as exposure, can be made in English, being valued additionally.<br>The dedication required is 150 hours, which are distributed by the following scheme:<br>+ Work in the classroom: 60 hours<br>+ Work outside the classroom: 90 hours<br>- Personal study and examination: 15 hours<br>- Research: 15 hours<br>- Project: 60 hours |
| **ECTS** | 6 |
| **Level** | 1st course of a Master degree in Computer Engineering |

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| **Prerequisite(s)** | Programming skills in Java or HTML5 + JavaScript<br>Knowledge of design and modeling software |
| **Overall description + Relation to Game Industry**<br>(max. 2.500 characters) | This course aims to explore the interactive multimedia and video games in its different and varied applications (leisure, serious games, educational games, gamification ...) to enable graduates of this Master not only to guide its career towards these sectors, but can easily incorporate audiovisual elements, highly interactive, rich, and aspects of gameplay and gamification, projects and developments of any kind. |
| **list/enumeration of themes/topics that should be mastered during the course** | ITEM 1. Historical development of video games and multimedia.<br>ITEM 2. Conceptual design of a video game or interactive multimedia solution. Games theory. Types of games. Genres, platforms, targets. Game elements. Gamification.<br>ITEM 3. Design of interaction and gameplay. Usability and accessibility.<br>ITEM 4. Architecture and programming of a video game. Technologies. Programming levels. Bookstores. Basic proposals: Java and HTML5-JavaScript.<br>ITEM 5. 2D vs 3D. Drawn, sprites, 2D animation. Cameras, modeling, texturing, lighting and 3D animation.<br>ITEM 6. Timing, collision detection, physical and artificial intelligence in video games.<br>ITEM 7. Sound in video games.<br>ITEM 8. Communications and multiplayer competitive and cooperative environments.<br>ITEM 9. Project Management in the video game industry.<br>ITEM 10. Testing, close, distribution. Market aspects of gaming and multimedia. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | GENERIC COMPETENCE CG3. Communication in foreign language (English). Understand and be understood verbally and written using (especially important in the process of European Convergence for the expansion of the international dimension of qualifications) English language. Level 2: Communicate fluently so argued in another language in texts of some complexity.<br>SPECIFIC COMPETENCE CE1. Locate, analyze and propose methodologies, methods, techniques, programs specific use, norms and standards of computer graphics, video, animation and interactive multimedia.<br>SPECIFIC COMPETENCE CE2. Conceptualize, design, develop and evaluate the individual computer products, systems, applications and services in the areas of multimedia and gaming interaction.<br>SPECIFIC COMPETENCE CE3. Create, manage and design the distribution of multiplatform interactive multimedia software products. |

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| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | Generic and specific competences will be assessed through three instruments:<br>+ RESEARCH WORK. Individual report or document in multimedia format. Topic related to the subject chosen by each student. Made in three steps, an initial approach, another final report and other direct validation with the teacher (small defense work). This work is mandatory and its overall rating is 20% of the grade for the course. If it is done in English, an additional 5%.<br>+ TEST. Only exam in test mode, where the theoretical contents of the subject will be evaluated. Evaluation of 15% of the grade for the course.<br>+ PROJECT. Small functional application related to the subject, in groups, with theme chosen by the students. Made in four steps: initial definition, intermediate prototype, final project and defense of the project. Evaluation of 65% of the grade for the course. If the documentation and defense are conducted in English, 5% extra.<br>Continuous assessment will be made with partial deliveries of the research work and the project. For students who are introduced to the extraordinary call, both works will be done in a single delivery.<br>From the point of view of competences, the evaluation is:<br>+ GENERIC COMPETENCES = 10% (extra)<br>- CG3: Research = 5%, Project = 5%<br>+ SPECIFIC COMPETENCES + = 100%<br>- EC1: Research = 20%<br>- CE2: Examination = 15%<br>- CE3: Project = 65%<br>From the standpoint of individual and group work:<br>+ TEAMWORK = 65% (65% Project) (70% project in English)<br>+ INDIVIDUAL WORK = 35% (20% Labor Research Review 15%) (40% with work inv. In English)<br>The course will be passed if the sum of the scores for all evaluation activities is greater than or equal to 50%. |
| **References**<br>(max. 3 that are key for the programme/project) | + Egor Kuryanovich, Shy Shalom, Russell Goldenberg and Mathias Paumgarten, 2012. Development of HTML5 games. Anaya Multimedia<br>+ Mario Zechner, 2011. Development of games for Android. Anaya Multimedia.<br>+ Daniel González, 2011. Video game design. BRANCH. |
| **Hardware and software required** | N/A |

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| **Webpage** | N/A |

# Annex 60

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Internet protocols, technologies and services |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Diego López de Ipiña |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The main methods or techniques that materialize the teaching strategy used during the course are summarized:<br>+ *Lecture*. Presentation by the teacher of the contents contained in the syllabus of the course detailed and organized in the classroom. The materials, available for the clases, previously will be available for the students (as transparencies, tutorials, web pages, etc), classified by chapters.<br>+ *Self Experimentation*. Protocols and technologies for the generation of applications, services and Internet-based next-generation solutions studied have a reinforcement of practical laboratory classes. There will be two types of laboratory classes. Guided by the teacher where practical examples will be shown, following a strategy of "learning by example". Those made by the student from activities and exercises proposed by the teacher to reinforce student learning. Such activities will be corrected in the own laboratory sessions.<br>+ *Individual project*. Students must take an individual project to implement major protocols and technologies for the development of both Internet-based and highly scalable solutions.<br>According to the 5 ECTS assigned, dedication required to track the subject and compliance with its requirements is 125 hours, which will be distributed according to the following estimated times work:<br>+ Work in the classroom: 45 hours<br>- Exposition: 18 hours<br>- Practical activities guided by professor: 12 hours<br>- Individual Supervised activities in the classroom: 15 hours<br>+ Work outside the classroom: 75 hours<br>- Individual work on practical preparatory activities for individual project: 10 hours<br>- Working on individual project: 45 hours<br>- Review and study materials knowledge test: 18 hours<br>- Evaluation (knowledge test + individual project presentations): 2 hours |
| **ECTS** | 5 |
| **Level** | 1st course of a Master degree in Computer Engineering |

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| **Prerequisite(s)** | Java programming skills.<br>Knowledge of markup languages and Web programming. |
| **Overall description + Relation to Game Industry**<br>(max. 2.500 characters) | In this course the latest trends in protocols, technologies and tools for creating solutions / Internet services of last generation, highly usable (HTML5) and scalable (Cloud Computing) are addressed: communication models between prevailing nodes on the Internet, more beyond the ubiquitous HTTP protocol are leading to a more real-time web use, client-side HTML5 and technologies all around them that create more usable than ever web applications; the advantages of hosted services in the cloud, or cloud computing, and the use of the most important solutions to implement this new paradigm. |
| **list/enumeration of themes/topics that should be mastered during the course** | UNIT 1. INTERNET OF THE FUTURE. Introduction. Components of the Future Internet. Internet Services, Content and Things. Data Web: RDF and Linked Data.<br>UNIT 2. PARADIGM OF COMMUNICATION ON THE INTERNET. Approaches: service-oriented (SOA) and oriented resources (ROA). Services-oriented protocols: SOAP, WSDL and the WS family of protocols. Resources oriented protocols: REST. Asynchronous communication via HTTP: AJAX, COMET, Web Hooks, Server-sent events, Server-push and PubHubSubHub.<br>UNIT 3. WEB PROGRAMMING LANGUAGES FOR THE CUSTOMER. Applications with advanced web interfaces (RIA). The HTML5 standard. Stylesheets (CSS3). The JavaScript programming language. principles Responsive Web Design. JavaScript frameworks: jQuery and AngularJS.<br>UNIT 4. PROGRAMMING WEB TECHNOLOGIES IN THE CLOUD. The concept of Cloud Computing. Manifestations of Cloud Computing: IaaS, PaaS and SaaS. Web application development in Java: Basic introduction to servlets and JSP. Application development platforms in the Cloud: Amazon Web Services (AWS) and Google App Engine (GAE) for Java.<br>UNIT 5. DRAFT. Responsive RIA development of a real-time application hosted in the cloud (PaaS with Channel GAE API) based on HTML5 following a resource-oriented (REST) approach. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | SPECIFIC COMPETENCE CE1. Identify key areas of development and manifestations of Future Internet and its applicability in the development of Internet-based solutions.<br>SPECIFIC COMPETENCE CE2. Select the combination of protocols, paradigms and approaches best suited to the requirements of immediacy, scalability and fault tolerance of an Internet-based solution Internet programming.<br>SPECIFIC COMPETENCE CE3. Apply languages and current development of the client part of Internet-based solutions and applications web protocols. |

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| | SPECIFIC COMPETENCE EC4. Using the paradigm of cloud computing, tools and most popular approaches for the development of the server portion of an Internet-based programming solution. |
| **Outcomes** (max. 1.500 characters) | N/A |
| **Assignments** (example if available) | N/A |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Specific competences will be assessed by two instruments:<br>+ INDIVIDUAL WORK: Development of an Internet-based client and server by the student applying protocols and Internet and Web technologies. Used tools will be documented. The work will be evaluated on 7 points. Associated documentation and project presentation will be in English.<br>+ TEST OF KNOWLEDGE: A single short questions test of knowledge, where theoretical and practical contents of the subject will be evaluated. It will be evaluated on 3 points.<br>The grading system is as follows, from the point of view of the specific competences:<br>SPECIFIC COMPETENCES + = 100%<br>- Knowledge test = 30%<br>- Single Project = 70%<br>From the point of view of the activities performed, the instrument and percentage of assessment is as follows:<br>+ INDIVIDUAL PROJECT = 70%<br>- 70% Project assessment by the teacher, including use of English in presentation and documentation<br>+ INDIVIDUAL WORK = 30% (Knowledge test)<br>To pass the course the student must get at least 4 out of 10, in the knowledge test and a 5 out of 10 in the individual development work. |
| **References** (max. 3 that are key for the programme/project) | + Building the Real-time User Experience, Ted Roden, ISBN: 1449395945, 2010<br>+ HTML5 and JavaScript Web Apps, Wesley Hales, ISBN: 1449320511, 2012<br>+ JavaScript: The Definitive Guide: Activate Your Web Pages (Definitive Guides) by David Flanagan, 2011 |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 61

**Name of provider / GameHub partner institution / country:**

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| **Title** | Mobility and ubiquitous computing |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Juan Ignacio Vázquez |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The methodology is based on the introduction of concepts through lectures and case studies, followed by laboratory classes where students deepen and acquire the skills necessary for mobile application development and objects design connected through guided practice and practical exercises.<br>The following strategy will be used:<br>+ Presentations will be conducted through lectures, fundamental features, objects, advantages and disadvantages of each type of technology and architecture for the development of mobile applications and connected objects.<br>+ These classes will be complemented by discussions and case analysis for a 360-degree view (developer and user) process design, development and deployment of mobile applications and connected objects. Students develop documentation and present the cases they have studied in English.<br>+ Laboratory classes will be developed where students will take direct contact with development platforms and will gradually gain skills in their use through teacher-led practices. Such laboratory classes are complemented with practical exercises that allow students to face common problems in the development of these applications and apply the learned patterns. These exercises are spread throughout the semester and will be supervised by the teacher, through a process of continuous assessment.<br>+ The implementation of the theoretical and practical contents will be done by developing a project that integrates the skills, technologies and tools studied. The development of this project will take place during the final part of the course, in the time reserved for it in class, as outside the classroom. The tutoring teacher and students must plan milestones to be contrasted weekly. This project will be carried out individually or in groups of 2 people, and must be documented and submitted in English.<br>The dedication required is 150 hours, which are distributed by the following scheme:<br>+ Work in the classroom: 60 hours<br>- Lectures and case studies: 12 hours<br>- Laboratory classes: 36 hours |

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| | - Project development 12<br>+ Work outside the classroom: 90 hours<br>- Investigation of cases: 12 hours<br>- Application Development Exercises: 54 hours<br>- Project: 24 hours |
| **ECTS** | 6 |
| **Level** | 1st course of a Master degree in Computer Engineering |
| **Prerequisite(s)** | Java programming skills. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | This course provides the skills needed to design, develop, deploy and document applications for mobile and embedded in objects that can communicate with other systems on the Internet.<br>Mobile applications are up to date and there are included mobile videogames. |
| **list/enumeration of themes/topics that should be mastered during the course** | ITEM 1. MOBILE TECHNOLOGIES. Concepts. Basic principles. Architectures and design patterns. Usability and interaction. trading platforms (Android, iOS, Windows Mobile). Mobile Web (HTML5).<br>ITEM 2. DESIGN, DEVELOPMENT AND DEPLOYMENT OF MOBILE APPLICATIONS. Android application development. Activity, Services, Content Providers, Broadcast receivers, Location, Sensors. UI HTTP / JSON. Google Play.<br>ITEM 3. UBIQUITOUS COMPUTING TECHNOLOGIES AND CONNECTED OBJECTS. Concepts. Basic principles. Sensórica technologies, computing and communication. Architectures and design patterns. trading platforms (Arduino, Raspberry Pi, OpenPicus). Usability and interaction.<br>ITEM 4. DESIGN, DEVELOPMENT AND DEPLOYMENT OF APPLICATIONS FOR CONNECTED OBJECTS. Arduino development and Wi-Fi / Bluetooth. Introduction to development kit. Basic programming. Schedule of sensors and actuators. Communications Wi-Fi / Bluetooth.<br>ITEM 5. PLANNING AND IMPLEMENTATION OF PROJECTS FOR MOBILE AND CONNECTED OBJECTS. Identification of project objectives. Project planning. Identifying milestones. Division of responsibilities. Monitoring implementation. Documentation. Results presentation techniques. |
| **Competences/Learning objectives** (max. 1.500 characters) | GENERIC COMPETENCE CG3. Communication in foreign language (English). Understand and be understood verbally and written using (especially important in the process of European Convergence for the expansion of the international dimension of qualifications) English language. Level 2: communicate fluently to argue in another language in texts of some complexity.<br>SPECIFIC COMPETENCE CE1. Analyze, design and |

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| | develop applications based on Internet communication services for mobile terminals applications by selecting appropriate platforms and tools.<br>SPECIFIC COMPETENCE CE2. Analyze, design and develop prototypes based on physical objects connected to the Internet by using specialized platforms, applying design patterns and appropriate interaction.<br>SPECIFIC COMPETENCE CE3. Conceptualize, design and validate digital experiences based on the integration of physical objects connected and accessible Internet services through mobile terminals. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | Generic and specific competences will be assessed through three instruments:<br>+ ORAL PRESENTATION CASE. Students conduct studies and analysis of cases proposed by the teacher documented and presented in English language throughout the period of the course. This activity has a value of 20%.<br>+ PROBLEMS. The teacher will pose problems of development of mobile applications and connected objects that students will have to solve and deliver properly documented. This activity will consist on a series of deliveries, you will have a total value of 50%.<br>+ PROJECT. Students will develop a final group project where they integrate all skills related to planning, design and development of mobile applications and connected objects acquired during the development of the subject. The project will be documented and presented in English. This activity will have a value of 30% and is mandatory.<br>The grading system is as follows, from the point of view of the generic and specific competencies:<br>+ GENERIC COMPETENCES = 10%, to evaluate through the oral presentation of the case<br>- CG3: Oral presentation = 10%<br>+ SPECIFIC COMPETENCES = 90%<br>- CE1: Troubleshooting mobile application development = 30%<br>- CE2: Troubleshooting development of connected objects = 20%<br>- CE3: Case Analysis = 10% = 30% Project<br>From the point of view of the activities performed, the instrument and percentage of assessment is as follows:<br>+ Pairwork = 50% (= 30% Project and prototype objects connected = 20%)<br>+ Individual work + = 50% (Case Analysis = 20%, mobile |

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| | application prototype = 30%)<br>The course will be passed if the sum of the scores for all evaluation activities is greater than or equal to 50%. |
| **References**<br>(max. 3 that are key for the programme/project) | + C. ONUR. Android Apps with Eclipse. Apress, 2012 (1st Edition)<br>+ Z. MEDNIEKS, L. DORNIN, G. BLAKE-MEIKE, M. NAKAMURA. Programming Android: Java Programming for the New Generation of Mobile Devices. O'Reilly Media, 2012 (2nd Edition).<br>+ R. MEIER. Professional Android 4 Application Development. Wrox, 2012 (3rd Edition). |
| **Hardware and software required** | Eclipse, Android, Arduino |
| **Webpage** | N/A |

# Annex 62

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Advanced artificial intelligence |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Enrique Onieva |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | METHODS AND TECHNIQUES<br>+ Contextualization: before starting a new topic within the unit, students will share what they know previously. The teacher will intervene only to give the word and coordinate the exchange of ideas among students.<br>+ Exposition: the teacher will explain the key aspects of competences that are worked in the subject.<br>+ Practices in the laboratory: the teacher will explain the use of the needed tools to develop different practical works. Students will become familiar with all of them during the different practice sessions in the laboratory.<br>+ Teamwork: Students plan the distribution of tasks, allocation of resources and time and monitoring and control of the application of artificial intelligence methods to a real case. The teacher will supervise both the planning and project development through meetings and telematic testing.<br>+ Reading documents: the teacher will propose additional bibliography to deepen aspects covered in each problem.<br>The activities conducted in this subject are:<br>- Presentation and discussion of theoretical concepts<br>- Practical implementation and application of methods to real problems<br>- Implementation of a project application with the acquired knowledge<br>- Reading and personal study<br>Estimated dedication by the student of the subject is about 150h, distributed throughout the semester and exam period. The estimated distribution of dedication is:<br>+ In the classroom: 60 hours<br>- Exposition: 30 hours<br>- Practical activities guided by professor: 20 hours<br>- Individual Supervised activities in the classroom: 10 hours<br>+ Outside the classroom: 90 hours<br>- Reading and personal study: 15 hours<br>- Carrying out of practices: 25 hours<br>- Project: 50 hours |
| **ECTS** | 6 |
| **Level** | 1st course of a Master degree in Computer Engineering |

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| **Prerequisite(s)** | Programming skills.<br>Basic knowledge of Artificial Intelligence: Knowledge-based systems, search methods, etc. |
| **Overall description + Relation to Game Industry**<br>(max. 2.500 characters) | The main contribution of Advanced Artificial Intelligence course is problem solving and design of intelligent applications from existing requirements and adapting the technique or combination of appropriate techniques to each situation. In addition, this course is a student initiation to research in Applied Artificial Intelligence. |
| **list/enumeration of themes/topics that should be mastered during the course** | ITEM 1. INTRODUCTION. Introduction and history of artificial intelligence. Basics. Types of Artificial Intelligence problems. Examples of applications of Artificial Intelligence.<br>ITEM 2. FUZZY LOGIC. Grounds fuzzy logic. Definitions and basic concepts. Foundations of Fuzzy Logic. Fuzzy Rule Based Systems. Applications of Fuzzy Logic.<br>ITEM 3. BIO-INSPIRED ALGORITHMS. Introduction to bio-inspired algorithms. Genetic algorithms. Applications of bio-inspired algorithms.<br>ITEM 4. PROBABILISTIC REASONING. Fundamentals of Bayesian reasoning. Probabilistic graphical models. Propagation of evidence and inference. naive and parametric learning Bayesian network. Applications of probabilistic reasoning.<br>ITEM 5. NEURAL NETWORKS. Fundamentals of neural networks neural network architectures. Neural network models. Learning process. Applications of neural networks. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | SPECIFIC COMPETENCE CE1. Formulate problems and develop and implement solutions with fuzzy logic.<br>SPECIFIC COMPETENCE CE2. Analyze optimization problems and propose, develop and implement bio-inspired solutions.<br>SPECIFIC COMPETENCE CE3. Design and implement Bayesian methods to solve problems and apply learning in real trouble<br>SPECIFIC COMPETENCE EC4. Design and implement artificial neural networks for application to real problems. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |
| **Evaluation/Grading basis/Form of control**<br>(exams, project work, …) | Generic and specific competences will be assessed through three instruments:<br>+ CONTINUOUS EVALUATION: various practices carried out individually. Mandatory. Not to present these deliveries or whether evaluating them not passing continuous evaluation (out of 4 points, he should get half) must occur after such practices, allowing to recover 75% of the grade on these activities (3 points). |

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| | + PROJECT: a complete system of artificial intelligence for solving a real problem, as a result of design and programming using various methods, environments and tools. Made in group. A final delivery, mandatory and evaluable is taken into account.<br>+ EXAM: a single exam, in which short questions and multiple choice questions are combined, where they will assess both theoretical contents of the subject, and practical. It will be evaluated on 2 points.<br>The grading system is as follows, from the point of view of specific:<br>SPECIFIC COMPETENCES + = 100%<br>- CE1: Continuous Assessment = 10% = 10% Project, Test = 5%<br>- CE2: Continuous Assessment = 10% = 10% Project, Test = 5%<br>- CE3: Continuous Assessment = 10% = 10% Project, Test = 5%<br>- EC4: Continuous Assessment = 10% = 10% Project, Test = 5%<br>From the point of view of the activities performed, the instrument and percentage of assessment is as follows:<br>+ PAIRWORK = 40% (Project)<br>+ INDIVIDUAL WORK = 60% (40% Continuous Assessment 20% examination)<br>The overall rating is the weighted sum of the grades obtained above, being necessary to pass the required parts. |
| **References**<br>(max. 3 that are key for the programme/project) | + Russell, S. & Norving, P. Artificial Intelligence: A Modern Approach. 3rd Ed. Prentice-Hall. 2010<br>+ Bishop, C.M. Pattern Recognition and Machine Learning. Springer. 2007<br>+ F. Glover, G.A. Kochenberger (Eds.). Handbook of metaheuristic. Kluwer Academic Press, 2003. |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 63

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Research, development and technological innovation |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Carlos Polo |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Classroom activities:<br>+ Lectures to contextualize and understand in detail the management of R & D, development of innovative projects and transforming them into business opportunities and finally in real companies. Performances by some entrepreneurs from different technology sectors will be included.<br>+ Analysis and problem solving, case studies, essays on each of the exposed situations.<br>+ Individual and group examples of projects developed by students Presentations.<br>Activities outside the classroom:<br>+ Personal study of the material collected during classroom activities.<br>+ Resolution of proposed work.<br>+ Personal work on a project that integrates different aspects learned during classes.<br>The dedication required is 100 hours, which are distributed by the following scheme:<br>+ Work in the classroom: 40 hours<br>- Lectures: 30 hours<br>- Case studies and other activities in the classroom: 10 hours<br>+ Work outside the classroom: 60 hours<br>- Personal study: 10 hours<br>- Review of cases and exercises: 20 hours<br>- Project: 28 hours<br>- Taking the exam: 2 hours |
| **ECTS** | 4 |
| **Level** | 1st course of a Master degree in Computer Engineering |
| **Prerequisite(s)** | None. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Innovation is not only a key element for any successful company, but also in launching any new business. In this course the necessary skills are worked: project management research, development and innovation in companies and technology centers and business application thereof (internally or externally): |
| **list/enumeration of themes/topics that should be mastered during the course** | UNIT 1. R & D MANAGEMENT. Technology development and transfer. Framework of R & D. Structure Science, technology and innovation. local, regional, national and transnational. Supply, management and execution of projects research. Instruments and tools. |

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| | UNIT 2. THE INNOVATION PROCESS. Introduction and inspiring Kick Off. The theory of innovation in the current economic situation. The destructive creation (the change is normal) of Peter Druker. The process ideas generation and product development. Management innovation. The management of the innovation process. Protection innovation. Personnel management in an innovative organization.<br>UNIT 3. THE ENTREPRENEURIAL PROCESS. Introduction to entrepreneurial thinking. Assessment Opportunities: From idea to opportunity. Creating business models and workshop Business Model Canvas. Defining the value proposition. The business plan. The communication of complex ideas and pitch. Marketing, sales and competitiveness in entrepreneurial processes. The entrepreneurial team. Managing a growing business. Finance for entrepreneurs and fundraising. The importance of efficient capital. Presentations of deal plans. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | GENERIC COMPETENCE CG2. Written communication. Interact effectively with other people through the clear expression of what you think and / or feel, through writing and graphics support. Level domain: 3. be convincing by written communication, demonstrating a style in the organization and expression of the content in long and complex writings.<br>GENERIC COMPETENCE CG12. Capacity for general direction, technical direction and project management research, development and innovation in companies and technology centers in the field of Computer Engineering.<br>GENERIC COMPETENCE CG16. Ability to apply principles related to economics and management of human resources and projects, as well as legislation, regulation and standardization of computing.<br>SPECIFIC COMPETENCE CE1. Lead and manage research projects, development and innovation in companies and technology centers.<br>SPECIFIC COMPETENCE CE2. Establish a logical and applied innovative process order to market distilling the ideas into business opportunities by applying different methodologies for innovation management.<br>SPECIFIC COMPETENCE CE3. Transform ideas and business opportunities in business initiatives to consolidate innovations in business realities. |
| **Outcomes**<br>(max. 1.500 characters) | N/A |
| **Assignments**<br>(example if available) | N/A |

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| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Generic and specific competences will be assessed through three instruments:<br>+ CONTINUOUS EVALUATION: various deliveries and periodic reviews of personal work and / or components of the project. Made individually and / or in groups. Not mandatory.<br>+ PROJECT: development of an innovative project for a real company that could potentially throw it to the market. Made in groups. It includes a final delivery (3-point), and a series of partial deliveries.<br>+ EXAM: a single examination where practical and theorical contents will be evaluated. It will be evaluated on 3 points.<br>The grading system is as follows, from the point of view of the generic and specific competencies:<br>+ GENERIC COMPETENCES = 20%, to evaluate through teamwork within the project and during the continuous assessment<br>- CG2: Continuous Assessment = 2% = 2% Project, Test = 1%<br>- CG12: Continuous Assessment = 2% = 2% Project, Test = 1%<br>- CG16: Continuous = 4% Evaluation Project = 4%, 2% Examination =<br>+ SPECIFIC COMPETENCES = 80%<br>- CE1: Continuous Assessment = 8% = 8% Project, Test = 2%<br>- CE2: Continuous Assessment = 8% = 8% Project, Test = 2%<br>- CE3: Continuous Assessment = 16% = 16% Project, Test = 4%<br>From the point of view of the activities performed, the percentages of assessments are as follows:<br>+ GROUP WORK = 70% (40% continuous assessment, 30% Project)<br>+ INDIVIDUAL WORK = 30% (30% Examination)<br>The course will be passed if the sum of the scores for all evaluation activities is greater or equal to 5 points out of 10 possible. |
| **References** (max. 3 that are key for the programme/project) | + P. TROTT, 2011. Innovation Management and New Product Development (5th Edition). Prentice Hall.<br>+ C. CHRISTENSEN, 2011. The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business. HarperBusiness.<br>+ P. DRUKER, 2006. Innovation and Entrepreneurship. HarperBusiness. |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 64

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Research seminar |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | Diego López de Ipiña |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The main methods or techniques used during the course are summarized and enphasize the teaching strategy:<br>+ *Lecture*. Presentation by teachers of the contents included in the agenda of the subject. The materials, available during the classes will be previously available to students (as transparencies, tutorials, web pages, etc), classified by subject.<br>+ *Teamwork*. Students in pairs must perform a research plan about a research project. An important part of the research will be the approach to a solution to at least one research problem. It must demonstrate an understanding of the problem and a clear view of the techniques and theory necessary to solve<br>According to the 6 ECTS assigned, dedication required to follow the course and fulfilling its requirements is 150 hours, which will be distributed according to the following estimated work times:<br>+ Work in the classroom: 45 hours<br>- Exposition: 30 hours<br>- Practical activities guided by professor: 15 hours<br>+ Work outside the classroom: 105 hours<br>- Working group project: 65 hours<br>- Review and study materials knowledge test: 38 hours<br>- Evaluation (knowledge test + group project presentations): 2 hours |
| **ECTS** | 6 |
| **Level** | 1st course of a Master degree in Computer Engineering |
| **Prerequisite(s)** | Basic knowledge of statistics.<br>Project planning and writing of scientific and technical documentation. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | This course addresses the need of every engineer that wants to direct his career towards research. It includes to know which research existing methodologies exist, how to apply techniques of quantitative and qualitative analysis of data collected in the experimental phase, how to create a research proposal, how to create a plan for a research project and how to disseminate the results through writing articles and conference presentations. |

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| **list/enumeration of themes/topics that should be mastered during the course** | Unit 1. Introduction to Research in Engineering (13.5 hours - Diego Lopez de Ipiña (9 hours) and Igor Santos (4.5 hours)). Characteristics. Research methodologies applicable to the domain of Engineering. Components of a research project engineering. Lessons learned from doctoral theses in Engineering. Scientific publications Impact indicators and Engineering.<br>Unit 2. Qualitative Methods (6 hours - Unai Aguilera). Research methodologies based on experimentation applied to engineering. Strengths and weaknesses of a scientific publication describing experimental work.<br>Unit 3. Quantitative Methods and Decision Theory (6 hours - Pablo Garcia Bringas). Decision Theory. Metrics quality and quantity of samples and data to perform engineering research. Methods and validation tools and data management.<br>Unit 4. Projects of basic and applied (4.5 hours - Asier Perallos) research. Science and technology plans at regional, national or European level. Taxonomy Horizon 2020 research projects. Good practice for the presentation of research projects.<br>Item 5. Preparation of a research plan (15 hours - Esther Alvarez). Hypothesis and objectives of a research project engineering. literature review. Methodology to be applied: phases, tasks and schedule for processing. |
| **Competences/Learning objectives** (max. 1.500 characters) | GENERIC COMPETENCES<br>C.G.4.- TROUBLE RESOLUTION.<br>Express clearly ideas, knowledge and feelings through words, adapting to the characteristics of the situation and the audience to gain their understanding and adherence.<br>Domain level. Propose and build team solutions to problems in various areas, with a global vision.<br>SPECIFIC COMPETENCE CE1. Select the most appropriate methodology for the development of a research project in engineering literature sources.<br>SPECIFIC COMPETENCE CE2. Apply qualitative and quantitative methods to conduct research in Engineering.<br>SPECIFIC COMPETENCE CE3. Develop a viable research plan leading to a successful research project engineering. |
| **Outcomes** (max. 1.500 characters) | N/A |
| **Assignments** (example if available) | N/A |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Generic and specific competences will be assessed by two instruments:<br>+ TEAMWORK: Creation of a research plan for the development of a thesis project in Engineering. A final and evaluable delivery is contemplated. The work will be |

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| | evaluated on 7 points.<br>+ TEST OF KNOWLEDGE: Unique knowledge test in the form of short questions, where both theoretical and practical contents of the subject will be evaluated. It will be evaluated on 3 points.<br>The grading system is as follows, from the point of view of the generic and specific competencies:<br>+ GENERIC COMPETENCE = 10%<br>- Presentation and documentation of group project = 10%<br>+ SPECIFIC COMPETENCE = 90%<br>- Knowledge test = 30%<br>- Group project = 60% |
| **References**<br>(max. 3 that are key for the programme/project) | N/A |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 65

**Name of provider / GameHub partner institution / country:**

| | |
|---|---|
| **Title** | Academical directed works |
| **Institution / Department** | University of Deusto – Informatics Engineering Dept. |
| **Lecturer** | |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | The process to follow is: a) the student presents a proposal of a research work to the teacher or tutor; b) the teacher or tutor authorizes work depending on the viability and ensuring that it meets the requirements and the effort equivalent to 6 ECTS credits; c) the student does the work and attends tutorials with your supervisor and d) the work is evaluated.<br>The main methods or techniques used during the course are summarized and emphasizes the teaching strategy:<br>- Individual work. The student will make a research on an area of interest related with the cursing Master which will be supervised by a teacher or tutor of the Faculty of Engineering. An important part of individual research is the approach to a solution to at least one research problem. It must demonstrate the understanding of the problem and a clear view of the techniques and theory needed to solve it.<br>- Supervision and mentoring. The student will attend a meeting every two weeks to work with the supervisor to report the progress and be guided by the following phases of work.<br>According to the 6 ECTS assigned, dedication required to follow the course and fulfilling its requirements is 150 hours, which will be distributed according to the following estimated work times:<br>- Initial interview and work plan: 6 hours<br>- Working on individual project: 135 hours<br>- Tutorials with work supervisor: 8 hours<br>- Public presentation and evaluation: 1 hour |
| **ECTS** | 6 |
| **Level** | 1st course of a Master degree in Computer Engineering |
| **Prerequisite(s)** | Advanced technical skills in their specialty<br>Writing scientific-technical documentation. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | Academically directed works are formative activity that prepares students for engineering research. They are usually given by a teacher or tutor of the Faculty of Engineering which aims to perform a specific research task aimed at introducing students of the Master in research and prepare to possibly pursue a doctorate work. |

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| **list/enumeration of themes/topics that should be mastered during the course** | Unit 1. Introduction to the ADW. Objectives and purpose. Structure of an academically directed work in Engineering. Bibliographic management tools. Reading of scientific articles. Reflection and research synthesis. Process and report the research activity. |
| **Competences/Learning objectives** (max. 1.500 characters) | SPECIFIC COMPETENCE CE1. Select the most suitable literature sources for the development of a research in engineering.<br>SPECIFIC COMPETENCE CE2. An analysis of the literature to synthesize and present the most relevant information and identify open research opportunities.<br>SPECIFIC COMPETENCE CE3. Reflect, plan and develop research activities in areas of interest within a field of engineering. |
| **Outcomes** (max. 1.500 characters) | N/A |
| **Assignments** (example if available) | N/A |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | Generic and specific competences will be assessed by this instrument:<br>+ INDIVIDUAL WORK: Development of research work in Engineering. a final and evaluable delivery is contemplated. The student will make an oral presentation of the work to the tutor. The work will be evaluated on 10 points. |
| **References** (max. 3 that are key for the programme/project) | N/A |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 66

**Name of provider / GameHub partner institution / country:**

| | |
|---|---|
| **Title** | ICT's multidisciplinary applications |
| **Institution / Department** | University of Deusto – Telecomunications Engineering Dept. |
| **Lecturer** | José Luis del Val |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | Methodology and Techniques<br>Classroom activities<br>- Lectures presentation of ideas and discussion of cases. Some classes will be taught by experts in the form of "Master Class".<br>- Work with the case method, understanding of the problem and definition of the model to its resolution.<br>- Active experimentation and group work to contextualize competences related to creativity (Generating and evaluating ideas) and customer identification and needs using the proposed techniques and strengthening the conceptualization of the ideas presented.<br>- Sharing sessions for both the analysis of reality to the interpretation of cases resolved in the classroom, leading to the conceptualization of the models presented.<br>Activities outside the classroom<br>- Reading and personal work on previously proposed material and after activities in the classroom, so that students get an autonomous and meaningful learning.<br>Students must perform autonomously or in teams (depending on the approach activity):<br>- Resolution of cases proposed by the teacher.<br>- Proposal for technological innovation and the associated business model.<br>With these works they will be reflected all expected learning outcomes.<br>The student work plan is as follows<br>- Work in the classroom (25 hours):<br>- Theoretical / practical exposition: 10 hours<br>- Planning, resolution and presentation of case studies: 15 hours<br>- Work outside the classroom (50 hours):<br>- Preparation and resolution of practical cases: 10 hours<br>- Finding information and reading: 15 hours<br>- Preparation and development of an innovation project: 25 hours<br>- Total: 75 hours |
| **ECTS** | 3 |
| **Level** | 1st course of a Master degree in Telecomunications Engineering |

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| **Prerequisite(s)** | None. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | This course aims to familiarize students with the innovation process, enabling him to conceive and design new products and services, new processes with clear customer orientation and relying on his technological knowledge. . |
| **list/enumeration of themes/topics that should be mastered during the course** | Unit 1. Innovation. Typologies. Information sources. Examples and case studies.<br>Unit 2. The creativity and communication. Techniques generation and evaluation of ideas. Design Thinking. Communication of Ideas.<br>Unit 3. Business Model: Business Model Canvas and Lean Startup.<br>Unit 4. Innovative Process Management.<br>With crosscutting:<br>Sectoral technological innovation: Health, Transportation, Digital Home, SmartCities, Communication and Entertainment, Industry 4.0. |
| **Competences/Learning objectives** (max. 1.500 characters) | SPECIFIC COMPETENCE CE1. Identify and analyze information relative to innovation supported by information technology in different sectors and multidisciplinary contexts.<br>SPECIFIC COMPETENCE CE2. Ability to understand needs and opportunities in multidisciplinary environments, develop new products and services.<br>GENERIC COMPETENCE CG1. Written communication. (Level 2) |
| **Outcomes** (max. 1.500 characters) | N/A |
| **Assignments** (example if available) | N/A |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | The evaluation system of this subject is based on case analysis, divided into two blocks<br>1. Development and discussion of cases (33% of grade)<br>2. Innovation project team developed (67% of grade)<br>To pass the course the student must deliver the final project and obtain at least 50% in the qualification.<br>The assessment in the extraordinary call follows the same scheme. It may draw up an additional case to improve the qualification of continuous evaluation and innovation project could have individual character. |
| **References** (max. 3 that are key for the programme/project) | Blank, Steve, «Four Steps to the Ephiphany: sucessfull strategies for products that win», cafepress.com, 2005.<br>Brown, Tim, Change by Design: How design thinking transforms organizations and inspires innovation, Harper Collins, 2009.<br>Cooper, Robert, G.,Winning at New Products: creating value trough innovation, Basic Books, Perseus Publishing, 4th edition, 2011. |

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| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 67

**Name of provider / GameHub partner institution / country:**

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|---|---|
| **Title** | Artistic expression |
| **Institution / Department** | University of Deusto – Industrial Design Engineering Dept. |
| **Lecturer** | José Ignacio Aguirre |
| **Language** | Spanish |
| **Type/Class format/Program structure** (number of lectures, practical classes, other work) | *Classroom activities*<br>The main activity of this course is based on continuous practice and constant exercises to achieve the maximum degree of motivation and confidence in students.<br>Presentation of real and representative cases of professional world so that students can assimilate theory and move to their everyday work the new concepts.<br>Projections of demonstrative and motivational videos.<br>Personal work's individual tutorials.<br>Sharing the work to debate results.<br>Discussions of current issues that are linked to the studied contents. |
| **ECTS** | 6 |
| **Level** | 1st course of a Bacherlor's degree in Industrial Design Engineering |
| **Prerequisite(s)** | None but motivation and continued practice. |
| **Overall description + Relation to Game Industry** (max. 2.500 characters) | The domain of graphical expression in the development of professional design activity is essential as it fulfills several essential functions. First, is a powerful tool for thinking and developping solutions quickly and effectively and, secondly, with the domain of manual drawing, a capacity of communication is treasured.<br>It is a fundamental skill for a game designer. |
| **list/enumeration of themes/topics that should be mastered during the course** | Unit 1 Introduction: Drawing as a design tool<br>Definition and evolution of drawing as a fundamental element in the different phases of the work of the designer and different professional fields and contexts.<br>Unit 2 Layout control<br>As a purely practical subject is a priority to get control of what is done and therefore it is necessary to start choosing the right medium and gain confidence with it. With this objective you make different exercises based on this concept.<br>Unit 3 3D View<br>Exercise in view of the volumes to pre visualize, understanding the objects from its configuration and constructive structure.<br>Unit 4 Perspective<br>The mastery of perspective is one of the fundamental bases |

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| | for drawing objects. The objective of this theme is to dominate the perspective because it represents a qualitative leap in the ability of drawing.<br>Unit 5 "From orthogonal to the spherical"<br>Knowing draw a perfect circle is synonymous with ability and mastery of artistic expression.<br>Unit 6 The proportion<br>Knowing the difference between a cube and a prism are its proportions and be able to represent him. To achieve this will enhance the capabilities of observation together with the requirement on their behalf.<br>Unit 7 Explanation of concepts<br>The development of explanatory concept panels for internal and external communication in preliminary stages of the generation of ideas.<br>Unit 8 Light<br>Light is a key element for our vision and well used, becomes a basic tool for drawing. Understand how to know and use incorporates important values to representing expression.<br>Unit 9 Presentation Sketching<br>Drawing as a display element through elaborated representations is a very appreciated professional tool.<br>Unit 10 Constructive drawing<br>The hand drawing is an important tool to configure a product before its final development. For this, tools like components exploded or viewing sections are steps important to preview costs and production processes.<br>Unit 11 Presentation<br>The ability to submit proposals and convince the customer with gimmicky, clear and quality visualizations, looking the blow, combining hand drawing with presentation tools, is a key resource to perform the design profession. Knowledge of presentation tools (Photoshop, ...)<br>Unit 12 From drawing to CAD<br>It is important to be able to trasnsform effectively hand drawings to 3D tools. This requires knowing the keys and in which fields they are applied. |
| **Competences/Learning objectives**<br>(max. 1.500 characters) | Within the map of title's generic competences, this course develops the following generic competence:<br>CG1 - LEARNING ORIENTATION. Using learning strategically and flexibly according to the persecuted target, from the learning system recognition.<br>Level Domain 1 (CG1.1) - Incorporate learnings proposed by experts and show an active attitude to assimilation.<br><br>Under the title's specific competences, this course develops the specific competence "CE-FB-07 - Apply techniques of artistic expression on morphology, color, textures etc." |

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| **Outcomes** (max. 1.500 characters) | N/A |
| **Assignments** (example if available) | N/A |
| **Evaluation/Grading basis/Form of control** (exams, project work, …) | The following table shows the grade percentage (%) of each activity distributed by competency:<br><br>EC EF Total<br>CE1 30 5 35<br>CE2 30 5 35<br>CE3 20 0 20<br>CG1 10 0 10<br>Total 90 10 100 |
| **References** (max. 3 that are key for the programme/project) | SJÖLEN, Klara y ALLAN, Macdonald, KEEOS Design Books AB, SUNDSVALL Sweden 2011<br><br>POWELL, Dick Presentation Techniques: A Guide to Drawing and Presenting Design Ideas Hardcover Little, Brown &<br>Company, 1990 |
| **Hardware and software required** | N/A |
| **Webpage** | N/A |

# Annex 68

**Deusto Foundation / GameHub P06 / Spain:**

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|---|---|
| **Title** | Kineage: Adapted Kinect game for exercise and fun |
| **Finacial support / Funding** | Bizkailab |
| **Target group** | Elderly people |
| **Initial situation** | The current increase in the ageing of our population and the lack of knowledge the elderly have of new technologies implies that they are immersed in the digital divide. This means that older people are not able to participate and are therefore excluded from digital society. Many new technologies that could improve their quality of life are not accessible to them, it is for example the case of smartphones, computers, video games, etc. In particular, it has been tested that the use of games can benefit their quality of life, health and wellbeing, as they reinforce cognitive and physical exercise by means of accessible leisure. |
| **Objectives + Relation to Game Industry** | One of the latest tendencies in the field of video games is the use of devices that do not require the use of remote controls, such as the Kinect sensor. This sensor recognizes the movements of the user, who controls the game with the body. On the market there exist various products made with Kinect. Nevertheless, these games do not work with users in wheelchairs, not being able to use this type of games. There are also older people with physical disabilities, such as those with muscular dystrophy, where in most cases low mobility in either of the upper extremities is presented. These people are also not able to access this type of serious game, since it is not adapted to their specific needs. Therefore, there is a lack of technological resources adapted to the specific needs of each user, leaving a great part of the ageing population without access to products that can improve their health, quality of life, and the enjoyment of their leisure time.<br>Physical rehabilitation is often necessary for individuals who suffer an injury or illness which causes a physical impairment, in order to restore movement and strength through supervised repetitive exercises. Alternatively, physical activity also improves cognitive performance and reduces cognitive decline. This tool focuses on therapeutic aspects of both cognitive and physical rehabilitation for older adults, as it improves memory by performing mental activities and physical rehabilitation at the same time. This way, exercise, rehabilitation and the enjoyment of an accessible leisure is promoted, also reducing the digital divide. |
| **Description of activities** | Kineage system is divided into two sections, devoted to physical and cognitive rehabilitation respectively:<br><br>1) Physical Rehabilitation: |

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| | This part of the game consist of three diff erent levels in which the user should collect various objects appearing on the screen by moving the arms, in order not to let the objects fall, promoting this way both the mobility of the user during the training (game play) and the cognitive process. Firstly, and in order to do the game more generalized, the game allows to specify the typology of the user, i.e., with or without any movement in their legs (use of the wheelchair), and giving the player the option to play standing or sitting.<br>Additionally, users may present limit mobility in either arm (even absence of absolute movement in either of the two members), thus being the game configured in such a way that the user can choose if it wished to play with the left arm, right arm or both. The game displays three diff erent levels of three minutes each to avoid fatigue in training. In the first level, the objects (cupcakes and bottles of wine) shall follow a vertical path. In the second level the number of these objects increases and in the level three the objects follow a horizontal path. At the end of each one of the levels the user shall reach a piece of cake, until achieving as a final reward a whole cake after finishing the three levels.<br><br>2) Cognitive Rehabilitation:<br>The main purpose of this part is to improve the memory and psychomotor activity by performing activities, as well as encouraging them to do physical exercise. A range of exercises, in which the user must perform various physical motions in order to solve them, have been developed following the clinicians' recommendations. In these activities the user has to memorize images or relate numbers to their corresponding denition (1-one), amongst others. The objective is to choose the correct answers (images) by moving the correct arm and thus improving the psychomotor activity of the patient. |
| **Expected results** | Even by having a total lack of knowledge of new technologies, the users are able to play the game, learn about its use and apply this knowledge in other technological fields, addressing the problem of the digital divide. |
| **Coordinating institution** | University of Deusto |
| **Partner institutions** | -Deustotech LIFE, Deusto Foundation<br>-Santa y Real Casa de la Misericordia de Bilbao |
| **Webpage** | N/A |

# Annex 69

**Deusto Foundation / GameHub P06 / Spain:**

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|---|---|
| **Title** | Psicoestimula: Gamification and psychostimulation for elderly people |
| **Finacial support / Funding** | Avanza Program |
| **Target group** | Elderly people |
| **Initial situation** | The fact that the games can be played at the users' convenience and from the comfort of their homes makes them easy to use, increasing willingness to perform the tasks and reducing expenditure and time for medical centers. |
| **Objectives + Relation to Game Industry** | The main objective of the system is to help this group improve some of their skills, such as spatial vision, memory or attention. |
| **Description of activities** | These are the two main games:<br><br>1) Puzzles Activities<br>Puzzle activities have been chosen to work with the elderly trying to improve their memory and spatial vision.<br>Firstly, the entire image is displayed for 10 seconds so that the user can try to memorise it and notice the details. The image is then divided into pieces and the user has to drag them into the correct positions on the main board. When checking, the system notifies the user if there is an error and he/she must move the pieces and try again. When the game has been correctly completed, a short explanation of the image content is displayed, and the user is given the option to continue playing (the level of difficulty increases as puzzles are completed) or exit.<br><br>2) Bingo Activities<br>This game is similar to conventional bingo but has words instead of numbers. This exercise focuses on improving the player's attention skills since he/she has to watch the words that are scrolled across the top part of the screen and mark them on his/her card. Each word on the card appears once, together with other words that are not on the card. Like the previous game, different levels of difficulty can be selected. |
| **Expected results** | 2 game designed for improvement physical and cognitive condition of elderly |
| **Coordinating institution** | Deustotech LIFE, Deusto Foundation |
| **Partner institutions** | -Deustotech LIFE, Deusto Foundation |
| **Webpage** | N/A |

# Annex 70

**Deusto Foundation / GameHub P06 / Spain:**

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|---|---|
| **Title** | eTangram: Psychostimulation technology for elderly people on the Tangram game |
| **Finacial support / Funding** | Industry, Innovation, Trade and Tourism Department of the Basque Government and the SPRI (Business development agency belonging to the Basque Government). |
| **Target group** | Young or Elderly people |
| **Initial situation** | eTangram Project has been specially designed for producing a transient increase in psychomotor activity for the elderly. |
| **Objectives + Relation to Game Industry** | • To desing and develop a hardware and a software prototype based on the Tangram game to train the physical capacity and memory of elderly people.<br>• To desing and develop a colaborative tool for patients and specialists.<br>• To monitor objective variables of the patients such as time and errors. |
| **Description of activities** | It is based on the Traditional Chinese game Tangram using augmented reality. The pieces or "Tans" are: 5 triangles (of three different sizes), 1 square, 1 parallelogram or rhomboid. It is divided into several levels that increase their complexity to exercise patient's cognitive functions. |
| **Expected results** | The developed game that will help people with psychomotor problems to improve their well being |
| **Coordinating institution** | Bilbomatica,<br>Deustotech LIFE, Deusto Foundation |
| **Partner institutions** | -Deustotech LIFE, Deusto Foundation<br>-Zuentzat<br>-Bilbomatica |
| **Webpage** | N/A |

# Annex 71

**University of Deusto / GameHub P01 / Spain:**

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|---|---|
| **Title** | Autogame |
| **Finacial support / Funding** | Basque Government |
| **Target group** | Vocational training |
| **Initial situation** | N/A |
| **Objectives + Relation to Game Industry** | The AUTOGAME project aims to develop a serious game for diagnosis and troubleshooting on wiring diagrams, and is part of the area of automotive electricity. |
| **Description of activities** | The game is designed as a complement to classroom training materials, in which students must identify faults in electrical diagrams, the reason why such damage has occurred and the component that failed. Wiring diagrams are presented to students and they must identify a single fault in each diagram. After doing this, they can continue with a new activity. |
| **Expected results** | We will be able to share hundreds of activities in our community to enrich the game. |
| **Coordinating institution** | University of Deusto |
| **Partner institutions** | -University of Deusto<br>-Vocational Training Centers of Iurreta<br>-Tartanga<br>-Alecop company |
| **Webpage** | N/A |

# Annex 72

**Deusto Foundation/ GameHub P06 / Spain:**

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|---|---|
| **Title** | JolasTEA |
| **Finacial support / Funding** | Provincial Council of Bizkaia |
| **Target group** | Children with ASD problems |
| **Initial situation** | The Autism Spectrum Disorder (ASD) is one of the most serious mental pathology of childhood because of the difficulty and complexity of its detection, diagnosis and treatment. |
| **Objectives + Relation to Game Industry** | Support experts, psychologists and pedagogues in the treatment of people with ASD, focusing on the areas affected by this disorder. |
| **Description of activities** | jolasTEA is composed by three large integrated and complementary modules, through which are collected and analyzed objective indicators. The first module is responsible of collecting personal information from people with ASD; The second module consists on serious games, in which the areas of involvement of this disorder work, giving priority to encourage interest and work towards people and interaction with them. Along the serious games, the system stores objective variables that allow professionals to keep track of the progress that the person is doing. Finally, the third module is responsible of analyzing the stored indicators in the first two sections, showing graphically to psychologists, pedagogues or responsible persons, the results and progress of the user. |
| **Expected results** | The game to treat people with ASD, focusing on the areas affected by this disorder. |
| **Coordinating institution** | DeustoTech LIFE, Deusto Foundation |
| **Partner institutions** | -DeustoTech LIFE, Deusto Foundation<br>-Datinet<br>-APNABI |
| **Webpage** | N/A |

# Annex 73

**Deusto Foundation / GameHub P06 / Spain:**

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|---|---|
| **Title** | Biofeedback |
| **Finacial support / Funding** | Basque Government |
| **Target group** | N/A |
| **Initial situation** | The development of methodologies in human interaction with technology has advanced a great over the last few decades in fields such as IT, engineering and even psychology.<br>One of these technologies is Biofeedback: the ability to control certain physical or biological functions by receiving information about them.<br>This methodology was initially introduced in the field of medicine and, subsequently, spread to other spheres of activity such as IT and video games, with several studies having been carried out in this area about how to use this new technology so as to improve interaction between people and technology. |
| **Objectives + Relation to Game Industry** | It is thus possible for an individual to be aware of biological functions that they do not perceive under normal conditions, such as heart rate, blood pressure and skin conductance. The information reaches the individual in the form of visual or auditory stimuli which inform them about the state of a specific physiological function. |
| **Description of activities** | A Multi-sensor system for implementing biofeedback as a human-computer interaction technique in a game involving driving cars in risky situations. The sensors used are: Eye Tracker, Kinect, pulsimeter, respirometer, EMG (Electromiography) and GSR (Galvanic Skin Resistance). |
| **Expected results** | All the sensors used had an impact on the end results, whereby none of them should be disregarded in future lines of research, even though it would be interesting to obtain separate breathing values from that of the cardio. |
| **Coordinating institution** | DeustoTech LIFE, Deusto Foundation |
| **Partner institutions** | DeustoTech LIFE, Deusto Foundation |
| **Webpage** | N/A |