


UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

# Requirements Engineering

## 2022-2023

*Applied Software Engineering Group*  
*Department of Computer Languages and Systems*  
*University of Seville*  
*September 2022*

La traducción de este material docente ha sido financiada mediante la convocatoria 1.10B - Ayudas de innovación y mejora docente, convocatoria 2013-2014, modalidad B del II Plan Propio de Docencia de la Universidad de Sevilla. No ha habido financiación alguna para este proyecto de otros soportes.



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

### RE Presentation


- **Course learning objectives (I)**
  - When passed, the student should be able to:
    - Understand the basics of **requirements engineering** and its relationship with the rest of **software development**.
    - **Interact with customers & users** in previously prepared, structured **interviews** and **meetings**.
    - Analyze **problem domains** and develop **glossaries of terms**.
    - Analyze **organizations** and model their **business processes**, their **positive and negative aspects** and their **business objectives**.



September 2022

Requirements Engineering

1



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation


- Course learning objectives (II)
  - When passed, the student should be able to:
    - Understand the different types of **requirements**, how to **write them** and know their most usual attributes.
    - Develop complex **conceptual models** from requirements.
    - Develop **functional prototypes** from conceptual models.
    - Understand and set **traceability** relationships between RE and other development **products**.



September 2022

Requirements Engineering

2



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation


- Course learning objectives (III)
  - When passed, the student should be able to:
    - Work in groups on a **project** to develop a complete **Requirements Specification**.
    - Verify the **quality** of a requirements specification.
    - Validate a requirements specification using user interface **prototypes**.
    - Develop acceptance **tests** from requirements.



September 2022

Requirements Engineering

3



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project

4. Tools


5. Evaluation

6. Recommended reading

RE Presentation

- Course learning objectives (IV)
  - In other words, change your way of thinking...


Think first about **customers** and **users** and how to **help them do their job** before thinking about technological solutions.



September 2022

Requirements Engineering

3



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation

- Module I: IISSI Review
  - Software Engineering Basics
    - Software project & products
    - Software lifecycles
- Module II: Requirements Engineering
  - Introduction to Requirements Engineering:
    - RE in the development process
    - RE process
    - Requirement types and attributes




September 2022

Requirements Engineering

4

RE

3



UNIVERSIDAD DE SEVILLA

Escuela Técnica Superior  
de Ingeniería Informática

Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation


- **Module II: Requirements Engineering**
  - Requirements Elicitation:
    - Problem domain: documentation and glossary
    - Customers' & users' business: business models
    - Customers' & users' needs
    - Interviews and meetings
    - Techniques from Design Thinking
  - Requirements Documentation:
    - Requirements as a solution to C&U's needs
    - Writing C&U's requirements
    - Writing software requirements



September 2022

Requirements Engineering

5



UNIVERSIDAD DE SEVILLA

Escuela Técnica Superior  
de Ingeniería Informática

Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation


- **Module III: Requirements Analysis**
  - Requirements Modeling (UML)
    - Conceptual Modeling:
      - Class diagrams review
      - Advanced concepts in class diagrams
      - Scenarios as object diagrams
    - Functional and behavioral / dynamic model:
      - Statecharts
      - Sequence diagrams
      - System operations



September 2022

Requirements Engineering

6



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation


- **Module IV: Advanced RE**
  - Requirements Verification:
    - Requirements quality model
    - Requirements quality assessment
  - Requirements Validation:
    - User Interface prototyping and walkthroughs
    - Acceptance tests from requirements
  - Requirements Management:
    - Requirements traceability
    - Change request management



September 2022

Requirements Engineering

7



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation

- **Semester project**
  - Throughout the semester, a **mentored project** worked out in **groups** must be developed:
    - Development of the initial stages of a software system “as real as possible”
      - System Requirements Document (SRD)
      - System Analysis Document (SAD)
      - Functional Prototype (optional)
  - Each group will have a **mentoring** professor.
  - There will **two partial deliveries** during the semester, prior to the final delivery.
  - **Project management** and **version control** tools **must** be used.



September 2022

Requirements Engineering

8

UNIVERSIDAD DE SEVILLA

Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project

4. Tools

5. Evaluation

6. Recommended reading

RE Presentation

- Semester project
  - **Attendance** to laboratory classes dedicated to **project mentoring** project is **mandatory**.
  - Student groups **must** do **presentations** about their progress in their semester projects.

September 2022

Requirements Engineering

8

UNIVERSIDAD DE SEVILLA

Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project

4. Tools

5. Evaluation

6. Recommended reading


RE Presentation

- Recommended tools for the semester project
  - All tools can be either used in the **cloud** or can be installed on the student's **laptop** computer.
    - **toggl track** (project management)
    - **GitHub** (version control)
    - **Balsamiq** (user interface prototyping)
    - **Signavio** (BPMN and UML)
    - **PlantUML** (UML diagrams)
    - **REM, REMUS** (requirements management)
    - **WordPress, OpenXava, Grails** (functional prototyping)
  - If **approved** by the mentoring professor, other equivalent tools can be used.

September 2022

Requirements Engineering

9



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


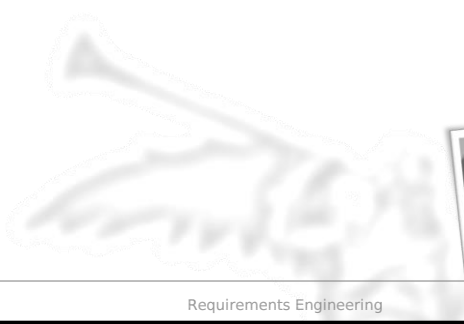
4. Tools

5. Evaluation

6. Recommended reading

RE Presentation


- Per-course / 1<sup>st</sup> call evaluation
  - Four parts are considered for per-course evaluation:
    - Theory (T)
    - Semester Project (P)
    - Functional Prototype (F)
    - Extra activities portfolio (X)



September 2022

Requirements Engineering

10



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


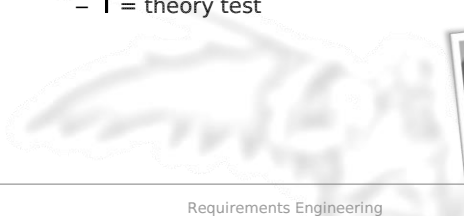
4. Tools

5. Evaluation

6. Recommended reading

RE Presentation

- Per-course / 1<sup>st</sup> call evaluation
  - Theory (T)
    - One or more theory exercises, including at least a test about the course's theory.
    - Other exercises, such as conceptual modeling exercises, could be scheduled according to the learning needs detected.
    - If other exercises are performed:
      - $T = 0.6$  (theory test) +  $0.4$  (average other exercises)
    - else
      - $T =$  theory test



September 2022

Requirements Engineering

10

UNIVERSIDAD DE SEVILLA

Escuela Técnica Superior de Ingeniería Informática

Departamento de Lenguajes y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project

4. Tools

5. Evaluation

6. Recommended reading

RE Presentation





• Per-course / 1<sup>st</sup> call evaluation


– Semester Project (P)

• As described in previous slides.

– Functional Prototype (F)

• A functional prototype developed as part of the semester project using **low-code tools** like WordPress, OpenXava, Grails, jHipster, etc.





September 2022

Requirements Engineering

10

UNIVERSIDAD DE SEVILLA

Escuela Técnica Superior de Ingeniería Informática

Departamento de Lenguajes y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project

4. Tools

5. Evaluation

6. Recommended reading

RE Presentation



• Per-course / 1<sup>st</sup> call evaluation

– Portfolio of Extra Activities (X)

• Group or individual activities related to the course and **previously approved** by the mentoring professors, e.g., videos about tools.

• The **maximum score** of each activity is 1.

• The **maximum X score** is 2.



September 2022


Requirements Engineering

10

RE

8





UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation


- Per-course / 1<sup>st</sup> call evaluation
  - Let **B** be the **base** grade:
    - $B = 0.6 \cdot P + 0.4 \cdot T$
  - Let **C** be the **per-course** grade:
    - If  $(P \geq 5)$  and  $(B \geq 5)$  then
      - $C = \max(0.8 \cdot B, 5) + 0.2 \cdot F + X$
    - else if  $(P \geq 5)$  and  $(B < 5)$  then
      - $C = B$
    - else if  $(P < 5)$  then
      - $C = \min(4, B)$



September 2022

Requirements Engineering

10



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation

- Per-course / 1<sup>st</sup> call evaluation
  - All **passed parts** are saved for 2<sup>nd</sup> and 3<sup>rd</sup> calls.
  - **Special mentions\*** shall be granted to students graded as **outstanding\*\*** at the discretion of the professors (one special mention for every 20 students as most).




September 2022

Requirements Engineering

10

\*Matrículas de honor.

\*\*Sobresaliente.



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project

4. Tools


5. Evaluation

6. Recommended reading

RE Presentation

- Per-course / 1<sup>st</sup> call evaluation
  - In accordance with the regulations of the University of Seville...


There is no 1<sup>st</sup> call official exam, only per-course evaluation, which shall be carried out during class hours.



September 2022

Requirements Engineering

10



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation

6. Recommended reading

RE Presentation

- Ordinary evaluation – 2<sup>nd</sup> & 3<sup>rd</sup> calls
  - Same criteria as per course.
  - Students must sit for all **failed parts**.
  - Not sitting for a **failed part** implies a **0** (zero) grade for that part.
  - Sitting for a **passed part** implies **resignation** of the previously obtained grade.




September 2022

Requirements Engineering

11

RE

10



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior de Ingeniería Informática  
Departamento de Lenguajes y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project



4. Tools

5. Evaluation

6. Recommended reading

RE Presentation


- Ordinary evaluation – 2<sup>nd</sup> & 3<sup>rd</sup> calls
  - Projects must be **mentored**, son only projects that were **initiated during the semester** are admitted in 2<sup>nd</sup> and 3<sup>rd</sup> calls.
  - The portfolio of extra activities (X) **cannot be augmented** in 2<sup>nd</sup> and 3<sup>rd</sup> calls.



September 2022

Requirements Engineering

11



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior de Ingeniería Informática  
Departamento de Lenguajes y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project

4. Tools

5. Evaluation

6. Recommended reading

RE Presentation

- Recommended reading

#ISSN: 2444-8729  
<https://doi.org/10.14201/eks2017182127146>

Todo lo que nunca pensaste que los alumnos sub 18 sabían sobre proyectos

Everything You Never Thought Under 18 Students Knew about Projects

Isabel Ramos, Javier J. Gutiérrez, Carlos Arévalo, Francisco J. Domínguez, Juan M. Cordero, Manolo Mejías

Departamento de Lenguajes y Sistemas Informáticos, Escuela Técnica Superior de Ingeniería Informática, Universidad de Sevilla, España  
{iramos, javier, carlosarevalo, fjdominguez, cordero, risoto}@us.es

Resumen

Organizar excursiones o meriendas, montar un equipo del juego on-line de moda, estudiar en grupo y muchas cosas más son actividades habituales en jóvenes (y no tan jóvenes). Las actividades anteriores pueden enmarcarse en la definición de proyecto, ya que todas cuentan con un marco temporal definido, tienen recursos limitados que es necesario gestionar y plantean objetivos que se desea cumplir. Sin embargo, en basándonos en nuestra experiencia docente en asignaturas universitarias relacionadas con la gestión

Abstract


Organizing excursions or afternoon snacks, putting together a team of the most fashionable online game as well as studying in groups and many other things are common activities among young people. Such activities are framed in a project, since they all have a defined time framework, they have limited resources that need to be managed and they set goals that must be met. However, according to our professional experience in university subjects related to IT projects management, teaching this module

<http://revistas.usal.es/index.php/revistatesi/article/download/eks2017182127146/17454>

September 2022

Requirements Engineering

12



UNIVERSIDAD DE SEVILLA  
Escuela Técnica Superior  
de Ingeniería Informática  
Departamento de Lenguajes  
y Sistemas Informáticos

1. Subject goals

2. Theory

3. Project


4. Tools

5. Evaluation


6. Recommended reading

RE Presentation

- Comments, suggestions, ...



Amador Durán Toro  
[amador@us.es](mailto:amador@us.es)  
Department of Computer Languages and Systems  
E.T.S. Computer Engineering, University of Seville, Spain



September 2022

Requirements Engineering

12