# COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

## 1. Program information

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|---|---|
| 1.1 University | University of Oviedo |
| 1.2 Faculty | Faculty of Chemistry |
| 1.3 Department | Chemical and Environmental Engineering |
| 1.4 Field | Chemical Engineering |
| 1.5 Study level | Master |
| 1.6 Specialization | Chemical and Biochemical Process Technology - CBPT |

## 2. Course information

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|---|---|---|---|---|---|---|---|
| 2.1.1 Course name | | | | **Safety and Hazard Analysis** | | | |
| 2.1.2 Course code | | | | MINQUI01-1-007 | 2.1.3. Course category Fundamental/Specialized/Complementary | | S |
| 2.2 Course instructor | | | | Fernando Díez Sanz | | | |
| 2.3 Course instructors for applied activities (S, L, P, Pr) | | | | | Fernando Díez Sanz | | |
| 2.4 Year of study [2] | 1 | 2.5 Semester[3] | 2 | 2.6 Evaluation type[4] | E, A | 2.7 Course type [5] | DOB |

## 3. Amount of time estimated for course activities (hours / term)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.1 Hours /week | 2.5 | 3.2 course | 1.8 | 3.3a sem. | 0.7 | 3.3b laboratory | | 3.3c project | | 3.3.d. practice | | |
| 3.4 Total hours from curriculum[6] | 35 | 3.5 course | 25 | 3.6a sem. | 10 | 3.6b laboratory | | 3.6c project | | | | |

| Time spent for related activities[7] | Hours |
|---|---|
| Study of recommended books, course support, scientific papers and course notes | 40 |
| Practical skills development | 28 |
| Preparation of seminars / laboratory works / project phases / home works / presentations | 15.5 |
| Evaluation[8] | 3 |
| Other activities: | |

| | |
|---|---|
| 3.7 Total hours of individual study [9] | 86.5 |
| 3.8 Total hours per semestre[10] | 121.5 |
| 3.9 Number of credits | 4.5 |

## 4. Prerequisites (optional)

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| 4.1 Curriculum[11] | |
| 4.2 Learning outcomes | |

## 5. Requirements

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| 5.1 Conditions for course delivery[12] | Blackboard, video projector |
| 5.2 Seminar / Laboratory / Project delivery requirements[13] | Blackboard, video projector |

## 6. Overall objective of the course

The course aims to provide students with a foundational understanding of process and personal safety, and a practical application of techniques like HAZOP, fault tree and consequence analysis.

## 7. Learning outcomes

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|---|---|
| **Knowledge** | The student / graduate will:<br>1. Be aware of hazards in the chemical and processing industry, being able to evaluate risks in specific situations.<br>2. Have a knowledge and understanding of procedures for improving safety in equipment and operations of the chemical and process industry, with a view on the improvement of new equipment and operations design. |
| **Skills** | The student / graduate will:<br>3. Be able to identify and assess event entity and probability, and expertly handle qualitative and quantitative risk analysis tools (HAZOP, fault tree analysis).<br>4. Be able to quantitatively assess the consequences of accidents, fires, explosions, spills and toxic emissions. |
| **Responsibility and autonomy** | The student / graduate will:<br>5. Be aware of legislation, technical standards and good practices in safety, considering ethical implications, and understand the liabilities of companies in the prevention of accidents in the industry (Occupational Hazards Prevention Act, Seveso directives, etc). |

## 8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. The teaching method is also based on action-based methods, such as practical exercises, problem-solving, conference of professionals in the field, visits to companies, etc.

## 9. Course content

| **9. 1. Courses**[15] | **Teaching methods** | **Time allocation** |
|---|---|---|
| 9.1.1. Hazards in the chemical and process industries | Interactive lecture. Clarifying explanations. Conferences of professionals in the field. | 2 hours |
| 9.1.2. Occupational Health: Physical hazards | | 2 hours |
| 9.1.3. Occupational Health: Chemical and Biological hazards | | 2 hours |
| 9.1.4. Industrial safety | | 3 hours |
| 9.1.5. Fires and explosions | | 2 hours |
| 9.1.6. Storage and transport of chemicals | | 2 hours |
| 9.1.7. Safety analysis techniques: HAZOP and Fault Tree Analysis | | 4 hours |
| 9.1.8. Consequence analysis | | 4 hours |
| 9.1.9. Operational safety techniques | | 2 hours |
| 9.1.10. Other accidents | | 2 hours |
| **Course bibliography:**<br>(This section should include reference titles and materials developed by the course coordinator(s), available in printed and/or electronic format. Emphasis should be placed on materials published or updated in recent years.)<br>*Books:*<br>HAUPTMANNS. U. "Process and Plant Safety", Springer, Berlin, 2015.<br>*Webpages:*<br>European Agency for Safety and Health at Work, https://osha.europa.eu/en<br>U.S. Occupational Safety and Health Administration, https://www.osha.gov/<br>U.S. Chemical Safety Board, https://www.csb.gov/<br>UK Health and Safety Executive, https://www.hse.gov.uk/<br>Instituto de Seguridad y Salud en el Trabajo (España) https://www.insst.es/<br>Dirección General de Protección Civil y Emergencias (España), ttps://www.proteccioncivil.es/ | | |
| **9.2a Seminar** | **Working methods** [16] | **Time allocation** |
| Occupational Health. Industrial safety. HAZOP and Fault Tree Analysis. Consequence analysis. | Exercises and problem solving | 10 hours |
| **Bibliography for applied activities** (seminar / laboratory / project):<br>Same bibliography as courses. | | |

## 10. Evaluation

| Activity type | 10.1 Evaluation criteria | 10.2 Evaluation method | 10.3 Percentage of the final grade |
|---|---|---|---|
| 10.4 Final Exam | Completeness and correctness of knowledge.<br>Degree of mastery of specialized terminology and communication skills.<br>Ability to apply acquired skills.<br>Ability to process data and solve given problems. | Summative assessment test (final evaluation). | 70% |
| 10.5a Seminar | Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity | Active participation in activities.<br>Assignments. | 30% |

10.6 Conditions for passing

Grades from 0 to 10 points will be awarded to each activity of the course. The Final Exam has two parts, theory and solution of numerical problems, each part weighting 50 % of the exam score. The score of the Final Exam must be, at least, 4 points, and the score of each part of the exam (theory and numerical problems) must be at least 30 % (i.e. 1.5 points for each part). The score of the Seminar, must be at least 5 points. The Final Evaluation of the module is determined by considering the scores and weights assigned to each activity within the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: Fernando Díez Sanz

Course instructors for applied activities: Fernando Díez Sanz

Date of approval by the department:

Head of Department: Manuel Rendueles de la Vega

Date of approval by the Faculty Council:

Dean, José Javier Borge Álvarez