

## SYLLABUS

### Research Project in Software Engineering

University year 2025-2026

#### 1. Information regarding the programme

|                                     |                                             |
|-------------------------------------|---------------------------------------------|
| 1.1 Higher education institution    | Babeş Bolyai University                     |
| 1.2 Faculty                         | Faculty of Mathematics and Computer Science |
| 1.3 Department                      | Department of Computer Science              |
| 1.4 Field of study                  | Computer Science                            |
| 1.5 Study cycle                     | Master                                      |
| 1.6 Study programme / Qualification | Software Engineering                        |
| 1.7. Form of education              | Full time                                   |

#### 2. Information regarding the discipline

|                             |   |                                          |   |                         |                          |                        |  |           |
|-----------------------------|---|------------------------------------------|---|-------------------------|--------------------------|------------------------|--|-----------|
| 2.1. Name of the discipline |   | Research Project in Software Engineering |   |                         |                          | Discipline code        |  | MME9009   |
| 2.2. Course coordinator     |   |                                          |   |                         |                          |                        |  |           |
| 2.3. Seminar coordinator    |   |                                          |   |                         | Prof.PhD. Simona Motogna |                        |  |           |
| 2.4. Year of study          | 2 | 2.5. Semester                            | 4 | 2.6. Type of evaluation | C                        | 2.7. Discipline regime |  | Mandatory |

#### 3. Total estimated time (hours/semester of didactic activities)

|                                                                                       |            |                      |   |                                |              |
|---------------------------------------------------------------------------------------|------------|----------------------|---|--------------------------------|--------------|
| 3.1. Hours per week                                                                   | 3          | of which: 3.2 course | 0 | 3.3 seminar/laboratory/project | 2/0/1        |
| 3.4. Total hours in the curriculum                                                    | 36         | of which: 3.5 course | 0 | 3.6 seminar/laboratory/project | 36           |
| <b>Time allotment for individual study (ID) and self-study activities (SA)</b>        |            |                      |   |                                | <b>hours</b> |
| Learning using manual, course support, bibliography, course notes (SA)                |            |                      |   |                                | 20           |
| Additional documentation (in libraries, on electronic platforms, field documentation) |            |                      |   |                                | 20           |
| Preparation for seminars/labs, homework, papers, portfolios and essays                |            |                      |   |                                | 50           |
| Tutorship                                                                             |            |                      |   |                                | 14           |
| Evaluations                                                                           |            |                      |   |                                | 10           |
| Other activities:                                                                     |            |                      |   |                                | -            |
| <b>3.7. Total individual study hours</b>                                              | <b>114</b> |                      |   |                                |              |
| <b>3.8. Total hours per semester</b>                                                  | <b>150</b> |                      |   |                                |              |
| <b>3.9. Number of ECTS credits</b>                                                    | <b>6</b>   |                      |   |                                |              |

#### 4. Prerequisites (if necessary)

|                   |                                       |
|-------------------|---------------------------------------|
| 4.1. curriculum   | Computer Science Research Methodology |
| 4.2. competencies |                                       |

#### 5. Conditions (if necessary)

|                                      |  |
|--------------------------------------|--|
| 5.1. for the course                  |  |
| 5.2. for the seminar /lab activities |  |

### 6.1. Specific competencies acquired <sup>1</sup>

|                                     |                                                                                                                                                                                                                                           |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Professional/essential Competencies | <ul style="list-style-type: none"><li>- Analysis, design, and implementation of software systems</li><li>- Proficient use of methodologies and tools specific to programming languages and software systems</li></ul>                     |
| Transversal competencies            | <ul style="list-style-type: none"><li>• professional communication skills; concise and precise description, both oral and written, of professional results, negotiation abilities;</li><li>• good English communication skills.</li></ul> |

### 6.2. Learning outcomes

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Knowledge                    | <ul style="list-style-type: none"><li>- The graduate has the necessary knowledge to devise, model and design of complex software application</li><li>- The graduate possesses the fundamental knowledge for modelling, being able to analyse real life problems and to translate them in concrete requirements and to design a corresponding software model</li></ul>                                                                  |
| Skills                       | <ul style="list-style-type: none"><li>- The graduate has the ability to follow the entire life cycle of software system development</li><li>- The graduate has the ability to communicate and develop relation and partnerships with industrial partners and with all actors involved in the software development process</li></ul>                                                                                                    |
| Responsibility and autonomy: | <ul style="list-style-type: none"><li>- The graduate can use specific language and terminology for software engineering being able to communicate and interact with members of a team</li><li>- The graduate has the ability of interdisciplinary vision between computer science subdomains in order to combine them in a software system</li><li>- The graduate proves the capacity to reflect over own learning resources</li></ul> |

### 7. Objectives of the discipline (outcome of the acquired competencies)

|                                          |                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.1 General objective of the discipline  | The research project activity represents the individual work the student performs with the purpose to realize a scientific report on a given topic.                                                                                                                                                                       |
| 7.2 Specific objective of the discipline | <p>At the completion of this course, the student should:</p> <ul style="list-style-type: none"><li>- have documentation abilities on an established topic</li><li>- be able to design the table of contents of research project</li><li>- know how to write a technical document (research paper) in iterations</li></ul> |

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<sup>1</sup> One can choose either competences or learning outcomes, or both. If only one option is chosen, the row related to the other option will be deleted, and the kept one will be numbered 6.

## 8. Content

| 8.2 Seminar / laboratory                                                                                                                                                                                                                                                                                                                                                                                                                            | Teaching methods                 | Remarks |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------|
| Establish title and topic                                                                                                                                                                                                                                                                                                                                                                                                                           | Conversation, debate, case study |         |
| Bibliographic documentation                                                                                                                                                                                                                                                                                                                                                                                                                         | Conversation, debate, case study |         |
| Table of content v1                                                                                                                                                                                                                                                                                                                                                                                                                                 | Conversation, debate, case study |         |
| Relevance of the bibliographical sources and their assignment to the designed structure                                                                                                                                                                                                                                                                                                                                                             | Conversation, debate, case study |         |
| Investigate possible original contributions; discuss and debate problem modelling                                                                                                                                                                                                                                                                                                                                                                   | Conversation, debate, case study |         |
| Thesis writing                                                                                                                                                                                                                                                                                                                                                                                                                                      | Conversation, debate, case study |         |
| Final version of the thesis                                                                                                                                                                                                                                                                                                                                                                                                                         | Evaluation                       |         |
| Bibliography<br>M. Frențiu, I.A.Rus, Metodologia Cercetării Științifice în Informatică, Ed. Presa Universitară Clujeană, 2014.<br>Mora, M. (Ed.). (2012). <i>Research methodologies, innovations and philosophies in software systems engineering and information systems</i> . IGI Global.<br>- to be decided by student based on his/her research topic<br>- Internet resources on software projects and on the particular topics of the projects |                                  |         |

## 9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

|                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The course respects the IEEE and ACM Curricula Recommendations for Software Engineering studies;<br>• The course exists at the major universities in Romania offering similar study programs;<br>• Graduating a master program assumes experience in developing a research project |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Evaluation

| Activity type                                                                                                  | 10.1 Evaluation criteria                                                | 10.2 Evaluation methods                                                                                                                                                                                                                                                                   | 10.3 Percentage of final grade |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 10.4 Course                                                                                                    |                                                                         |                                                                                                                                                                                                                                                                                           |                                |
| 10.5 Seminar/laboratory                                                                                        | The ability to write a research report and present the obtained results | Each of the activities has a due date and a corresponding mark, on a 10-point scale. A penalty of 1pt per week are considered for delays.<br>Portofolio: 3 research reports<br>• Report 1: deliver: week 4<br>• Report 2: deliver: week 6<br>• Report 3: deliver: week 10<br>Presentation | 20%<br>20%<br>50%<br>10%       |
| 10.6 Minimum standard of performance                                                                           |                                                                         |                                                                                                                                                                                                                                                                                           |                                |
| • At least grade 5 (from a scale of 1 to 10)<br>• Fundamental knowledge to write and present a research report |                                                                         |                                                                                                                                                                                                                                                                                           |                                |

## 11. Labels ODD (Sustainable Development Goals)<sup>2</sup>

*Not applicable.*

Date:

12.04.2025

Signature of course coordinator

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Signature of seminar coordinator

Prof.dr. Simona Motogna

Date of approval:

...

Signature of the head of department

Assoc.prof.phd. Adrian STERCA

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<sup>2</sup> Keep only the labels that, according to the [Procedure for applying ODD labels in the academic process](#), suit the discipline and delete the others, including the general one for *Sustainable Development* – if not applicable. If no label describes the discipline, delete them all and write „*Not applicable.*”.