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|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------|-----|-----|-----|
| Software Engineering Institute                                   |                                                                                                                                                                                              |                                | Semester 1. of the curriculum<br>2026-27-1 |     |     |     |
| Name of the subject:                                             | Code of the subject:                                                                                                                                                                         | Credits:                       | Weekly hours:                              |     |     |     |
|                                                                  |                                                                                                                                                                                              |                                |                                            | lec | sem | lab |
| Advanced software development                                    | NSXHSFEBNF                                                                                                                                                                                   | 4                              | full-time                                  | 2   | 0   | 2   |
| Responsible person for the subject: Prof. Dr. Zoltán Imre Vámosy |                                                                                                                                                                                              |                                | Classification: professor                  |     |     |     |
| Subject lecturer(s): Zsolt Krutilla                              |                                                                                                                                                                                              |                                |                                            |     |     |     |
| Prerequisites:                                                   | NSXSFAEBNF                                                                                                                                                                                   | Basics of Software Development |                                            |     |     |     |
| Way of the assessment:                                           | Midterm-grade                                                                                                                                                                                |                                |                                            |     |     |     |
| Course description                                               |                                                                                                                                                                                              |                                |                                            |     |     |     |
| Goal:                                                            | During the practical sessions, students will become proficient in advanced software development technologies using the C# language. One of the three weekly hours is dedicated to a lecture. |                                |                                            |     |     |     |
| Course description:                                              | Advanced Features of the C# Language (Lambda Expressions, LINQ, Entity Framework, Attributes, Reflection, Creating and Using DLLs, Unit Testing, Mocks, Managing Processes and Threads)      |                                |                                            |     |     |     |

| <b>Lecture schedule</b>      |                                                                                                                                                              |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Education week               | Topic                                                                                                                                                        |
| 1.                           | Lecture: Delegates, Events, Lambda expressions<br>Lab: Delegates, Events, Lambda expressions                                                                 |
| 2.                           | Lecture: .NET (Standard, Core, Framework), System.IO, File and Directory handling<br>Lab: Practical exercises                                                |
| 3.                           | Lecture: XML, JSON, LINQ, XML serialization, JSON serialization, LINQ to object, LINQ to XML<br>Lab: XML and JSON serialization, LINQ to object, LINQ to XML |
| 4.                           | Lecture: DLL (Class Library), Reflection, Attributes<br>Lab: Practical exercises                                                                             |
| 5.                           | Lecture: Layering (MVC, MVP, MVVM, ASP.NET)<br>Lab: DLL, Reflection, Attributes                                                                              |
| 6.                           | Lecture: Entity Framework<br>Lab: Practical exercises                                                                                                        |
| 7.                           | Lecture: Unit tests<br>Lab: Using Entity Framework on databases                                                                                              |
| 8.                           | Lecture: Thread handling (thread, thread pool, task, process)<br>Lab: Practical exercises                                                                    |
| 9.                           | Lecture: Parallel programming<br>Lab: Unit tests (NUnit, Mocking)                                                                                            |
| 10.                          | Lecture: Database practice<br>Lab: Practical exercises                                                                                                       |
| 11.                          | Lecture: Consultation<br>Lab: Thread handling, parallel programming                                                                                          |
| 12.                          | Lecture: Break<br>Lab: Break                                                                                                                                 |
| 13.                          | Lecture: Midterm test (lecture)<br>Lab: Defense of project work                                                                                              |
| 14.                          | Lecture: Substitution for the midterm test (lecture)<br>Lab: Substitution for defense of project work                                                        |
| <b>Mid-term requirements</b> |                                                                                                                                                              |

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| Conditions for obtaining a mid-term grade/signature                                                                                                                                                                                                        | The conditions for obtaining a mid-year grade are a minimum of 50% on the midterm test and completion of a semester lab assignment issued by the instructor. Students who miss more than 30% of lab classes (in accordance with the regulations) or who participate in copying midterm or semester assignments (even as a source) will be disqualified. |
| <b>Assessment schedule</b>                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                         |
| <b>Education week</b>                                                                                                                                                                                                                                      | <b>Topic</b>                                                                                                                                                                                                                                                                                                                                            |
| 13.                                                                                                                                                                                                                                                        | Midterm test (lecture), Defense of project work (lab)                                                                                                                                                                                                                                                                                                   |
| 14.                                                                                                                                                                                                                                                        | Substitution for the midterm test (lecture) and defense of project work (lab)                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                         |
| <b>Method used to calculate the <i>mid-term grade</i> (to be filled out only for subjects with mid-term grades)</b>                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                         |
| To receive a passing grade, students must achieve 50% on the midterm test; for a B, 63%; for an A, 75%; and for an A+, 87%. Students who do not complete the midterm lab assignment will receive a failing grade regardless of their midterm test results. |                                                                                                                                                                                                                                                                                                                                                         |
| <b>Type of the replacement</b>                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                         |
| Type of the replacement of written test/mid-term grade/signature                                                                                                                                                                                           | The midterm test can be retaken during the last week or during the exam period as part of the midterm grade replacement. The deadline for the lab assignment is week 13, with late submission possible in week 14. If this is not done, the assignment can also be retaken as part of the midterm grade replacement.                                    |
| <b>Type of the exam (to be filled out only for subjects with exams)</b>                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                         |
| <b>Calculation of the exam mark (to be filled only for subjects with exams)</b>                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                         |
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| <b>Final grade calculation methods:</b>                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                         |
| <ul style="list-style-type: none"> <li>- Excellent: above 87%</li> <li>- Good: above 75%</li> <li>- Medium: above 63%</li> <li>- Sufficient: above 50%</li> <li>- Insufficient: below 50%</li> </ul>                                                       |                                                                                                                                                                                                                                                                                                                                                         |
| <b>References</b>                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                         |
| Obligatory:                                                                                                                                                                                                                                                | - Moodle (E-learning) learning materials                                                                                                                                                                                                                                                                                                                |
| Recommended:                                                                                                                                                                                                                                               | - Joseph Albahari: C# 12 in a Nutshell: The Definitive Reference. O'Reilly Media, 2023.                                                                                                                                                                                                                                                                 |
| Other references:                                                                                                                                                                                                                                          | - .NET documentation (online: <a href="https://learn.microsoft.com/en-us/dotnet/">https://learn.microsoft.com/en-us/dotnet/</a> )                                                                                                                                                                                                                       |