

| | Subject | Date |
|-----|---|----------|
| | Basics of C# Programming | |
| 1. | Introduced agenda of C# course | 24.02.25 |
| 2. | C# language and .NET platform | |
| 3. | Variables | 27.02.25 |
| 4. | Data types | |
| 5. | Static variables and constants | |
| 6. | Working with the console application | |
| 7. | Arrays | |
| 8. | C# arithmetic/comparison operations | |
| 9. | If else and Switch case constructions | 03.03.25 |
| 10. | Loops (For, Foreach, While, Do-while) | |
| 11. | Methods | |
| 12. | Method with params parameter | |
| 13. | Ref and Out keywords in methods | |
| 14. | Local and recursive function | |
| 15. | Tuple and Enum | 06.03.25 |
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| | Classes, Structs, Records and Namespaces | |
| 1. | Classes and objects | |
| 2. | Constructors, initializers, and destructors | |
| 3. | Fields and properties | |
| 4. | Method and static method in class | 10.03.25 |
| 5. | Structs | |
| 6. | Record type | |
| 7. | Namespace and global namespace | |
| 8. | Partial and extended classes | |
| 9. | Value types and reference types | 13.03.25 |
| 10. | Mutable And Immutable | |
| 11. | Boxing and Unboxing | |
| 12. | Nullability in value types and reference types | |
| 13. | Accessibility of the class and class members | |
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| | Improve searching and designing knowledges | 17.03.25 |
| 1. | How to search/find what you need? | |

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| 2. | How to use AI chats correctly? | |
| 3. | Select a project to atomize your organization | |
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| | Delegates, Events, and Lambdas | |
| 1. | Delegates and using of that | |
| 2. | Action and Func Delegates | |
| 3. | Anonymous Methods | |
| 4. | Lambdas | |
| 5. | Events | 20.03.25 |
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| | Collections and LINQ queries | |
| 1. | List<T> | |
| 2. | Dictionary<Tkey, Tvalue> | |
| 3. | ConcurrentDictionary<Tkey, Tvalue> | |
| 4. | Span<T> | |
| 5. | Queue<T> | |
| 6. | Stack<T> | 24.03.25 |
| 7. | HashSet<T> | |
| 8. | IEnumerable<T> and IQueryable<T> | |
| 9. | LINQ-queries | |
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| | Multithreading | 01.04.25 |
| 1. | Introduction | |
| 2. | Running Code Simultaneously | |
| 3. | Processes | |
| 4. | Threads | |
| 5. | Parallelism | |
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| | Asynchronous and Synchronous | 03.04.25 |
| 1. | Introduction | |
| 2. | Difference Between Concurrency, Parallelism, and Asynchrony | |
| 3. | Async/await methods | |
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| | Concurrency | 07.04.25 |

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| 1. | Introduction | |
| 2. | Difference Between Concurrency and Multithreading | |
| 3. | Avoid of concurrency issue | |
| 4. | Lock statement | |
| 5. | Concurrent collections | |
| 6. | Semaphore and SemaphoreSlim | |
| 7. | Mutex | |
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| | Exam 1 | |
| 1. | Review of all passed items | 10.04.25 |
| 2. | Tests | 14.04.25 |
| 3. | Review projects | |
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| | ASP.NET Core | 17.04.25 |
| 1. | Introduction to ASP.NET Core | |
| 2. | Creating a new project | |
| 3. | Create custom Controller | |
| 4. | Enable Swagger | |
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| | Object-Oriented Programming (OOP) | 21.04.25 |
| 1. | What is OOP and its concepts in C#? | |
| 2. | Inheritance | |
| 3. | Abstract Classes | |
| 4. | Read-only Properties in a Class | |
| 5. | Virtual Methods and Properties | |
| 6. | Hiding, Overriding, and Abstract Methods | |
| 7. | Interfaces | 24.04.25 |
| 8. | Interface Inheritance | |
| 9. | Generic Classes | |
| 10. | Generic Methods | |
| 11. | Generic Properties | |
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| | REST and API | |
| 1. | Introduction to REST | |
| 2. | Basic principles | |

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| 3. | Rules for creating routes | |
| 4. | Stateful vs Stateless communication | |
| 5. | Http methods and responses | 05.05.25 |
| 6. | CRUD operations with RESTful APIs | |
| 7. | Minimal APIs | 07.05.25 |
| 8. | CRUD operations with Repository pattern | |
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| | Request and Response | |
| 1. | Data transfer object (DTO) | |
| 2. | Using record | |
| 3. | Using the AutoMapper framework | 08.05.25 |
| 4. | Using the Mapster framework | |
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| | Data Validation in ASP.NET Core | 12.05.25 |
| 1. | Introduction | |
| 2. | Creating services for validation | |
| 3. | Using the FluentValidation framework | |
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| | Middleware | |
| 1. | Introduction | |
| 2. | Working Middleware | |
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| | Dependency injection (DI) | 14.05.25 |
| 1. | Introduction | |
| 2. | Dependency Lifecycle | |
| 3. | Service provider | |
| 4. | Creating your own services | |
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| | Databases | |
| 1. | Relational databases (MySQL, SQL Server, PostgreSQL, Oracle ...) | 15.05.25 |
| 2. | Non-Relational Databases (MongoDB, Redis, Elasticsearch ...) | |
| 3. | Work with SQL server and Postgres databases | 19.05.25 |
| 4. | Work with Redis and Elasticsearch databases | 22.05.25 |
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| | Entity Framework Core (ORM) | 26.05.25 |
| 1. | Entity Framework Core | |
| 2. | Using Entity Framework Core in ASP.NET Core | |
| 3. | Annotations vs fluent api | 29.05.25 |
| 4. | Working with logging | |
| 5. | Modeling and creating tables | |
| 6. | Creating relationships between tables | 02.06.25 |
| 7. | CRUD with Entity Framework Core | |
| 8. | Working with Interceptors | |
| 9. | Repository pattern for CRUD operation | |
| 10. | Eager loading , Lazy loading and Explicit Loading | 09.06.25 |
| 11. | IEnumerable<T> and IQueryable<T> | |
| 12. | Migration management | 11.06.25 |
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| | ASP.NET Core | 12.06.25 |
| 1. | Investigation | |
| 2. | Logging in ASP.NET Core | |
| 3. | Serilog | |
| 4. | Open Telemetry | 16.06.25 |
| 5. | Jaeger | |
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| | Memory Management in .NET | 19.06.25 |
| 1. | Value and reference types | |
| 2. | Stack and Heap | |
| 3. | Mutable and Immutable classes | |
| 4. | Boxing and Unboxing | |
| 5. | Garbage collector | |
| 6. | Small/Large Object Heap | |
| 7. | Managed and unmanaged code | 23.06.25 |
| 8. | Memory leak issue | |
| 9. | Dispose Pattern | |
| 10. | Finalizer | |
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| 1 | SOLID | 26.06.25 |
| 1.1 | Single Responsibility Principle | |

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| 1.2 | Open-closed Principle | |
| 1.3 | Liskov substitution Principle | |
| 1.4 | Interface Segregation Principle | |
| 1.5 | Dependency Inversion Principle | |
| 2 | DRY (Don't repeat yourself) | 30.06.25 |
| 3 | KISS (Keep it simple, stupid) | |
| 4 | YAGNI (You ain't gonna need it) | |
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| | <u>Software Architectures</u> | 03.07.25 |
| 1. | Layered Architecture | |
| 2. | Client Server | |
| 3. | Model View Controller | |
| 4. | Event Driven/Event-bus Architecture | |
| 5. | Monolithic Architecture | |
| 6. | Microservices Architecture | |
| 7. | Clean Architecture | 07.07.25 |
| 8. | Domain-Driven Design architectural/approach | |
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| | Design Patterns | |
| 1. | Introduction | |
| 2. | Creational design patterns | |
| 3. | Structural design patterns | |
| 4. | Behavioral design patterns | |
| 5. | Repository, Singleton, Builder, Dependency Injection patterns | 10.07.25 |
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| | MediatR and CQRS | |
| 1. | Introduction | |
| 2. | Implement both patterns | |
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| | Exam 2 | 14.07.25 |
| | Tests | |
| | Review projects | |
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| | Synchronous and Asynchronous communication | 17.07.25 |
| 1. | Introduction | |
| 2. | Synchronous communication | |
| 3. | Asynchronous communication | |
| 4. | RabbitMQ message broker | |
| 5. | Example with the standard and open-source libraries | 21.07.25 |
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| | Authorization and authentication | |
| 1. | Introduction | |
| 2. | Authorization and authentication methods | |
| 3. | Authorization and Authentication in REST | |
| 4. | Adding Authentication to ASP.NET Core (Bearer) | |
| 5. | Adding Authorization in ASP.NET Core | |
| 6. | JWT tokens | |
| 7. | Role of JWT in REST | |
| 8. | Header, Payload, Signature in JWT | |
| 9. | Creating a server for generating JWT tokens | 24.07.25 |
| 10. | Example by creating Microservice project | |
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| | Test Driven Development Methodology | 28.07.25 |
| 1. | Creating a Project Using TDD | |
| 2. | TDD principles | |
| 3. | Practice: Creating a simple calculator using TDD | |
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| | Unit testing | |
| 1. | Using the NUnit framework | |
| 2. | Using the xUnit framework | |
| 3. | Mock testing | 31.07.25 |
| 4. | Mocking using Moq | |
| 5. | Mocking using NSubstitute | |
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| | Integration tests | |
| 1. | Working with WebApplicationBuilderFactory | |
| 2. | Creating an HttpClient from a WebApplicationBuilderFactory | |

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| 3. | EF Core configuration under different test environments | |
| 4. | Using services from WebApplicationBuilderFactory | |
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| | DevOps – project deployment | |
| 1. | Introducing Azure, AWS and GitHub actions | |
| 2. | CI-CD pipeline | |
| 3. | Create GitHub action to run tests | |
| 4. | Create GitHub action for versioning | |
| 5. | Deploy application on cloud and on premise | |