

| #    |                         | Mavzu   |  | Reja  |  | Odatiy |
|------|-------------------------|---|--|---|--|--------|
| Jami |                         |   |  |   |  | 800    |
| 1    | C# PROGRAMMING LANGUAGE |   |  |   |  | 240    |
|      | 1.1                     | C# Basics                                       |  |   |  | 80     |
|      | 1.1.1                   | .NETni o'rnatish va dasturlash muhitini sozlash |  | 1. Understanding C# and .NET<br>2. Setup development environment<br>3. .NET SDK vs .NET Runtime<br>4. .NET CLI<br>5. The first Console Application                              |  | 3      |
|      | 1.1.2                   | Ma'lumot toifalari va o'zgaruvchilar            |  | 1. C# gramatikasi.<br>2. Variables<br>3. Naming convention<br>4. Primitive Data types<br>5. Dynamic vs object types<br>6. Getting and Setting default values<br>7. Input/Output |  | 3      |
|      | 1.1.3                   | Toifalar o'rtasida Casting va Converting        |  | 1. Implicit and explicit casting<br>2. System.Convert method<br>3. ToString()<br>4. Parse and TryParse  |  | 3      |
|      | 1.1.4                   | Operatorlar                                     |  | 1. Binary<br>2. Unary<br>3. Assignment<br>4. Logical<br>5. Conditional Logical<br>6. Bitwise and binary shift<br>7. Miscellaneous(sizeof, sizeof)                               |  | 3      |
|      | 1.1.5                   | Shart va tanlash operatorlari                   |  | 1. If<br>2. If else<br>3. nested if<br>4. Ternary operator<br>5.switch  |  | 3      |

|       |   |  |           |
|-------|---|--|-----------|
| 1.1.6 | Takrorlanish operatorlari                 | 1. for<br>2. while<br>3. do while<br>4. foreach<br>5. continue, break  | 3         |
| 1.1.7 | Funksiyalar bilan ishlash                 | 1. Funksiya nima?<br>2. Funksiyaning kiruvchi parametrlari(ref and out)<br>3. Qiymat qaytaradigan va qaytarmaydigan funksiyalar<br>4. Rekursiv funksiyalar<br>5. Debugging | 6         |
| 1.1.8 | Matnlar bilan ishlash                     | 1. String classi metodlari<br>2. String formatting<br>3. String interpolation<br>4. Verbatim string  | 6         |
| 1.1.9 | Massivlar bilan ishlash                   | 1. One demensional<br>2. Multi demensional<br>3. Array class metodlari   | 6         |
| 1.2   | <b>C# intermediate</b>                    |  | <b>80</b> |
| 1.2.1 | OOPga kirish                              | 1. OOP nima?<br>2. Class, field, method, constructor, destructor<br>3. Object instance hosil qilish, this keyword<br>4. Access modifiers                                   | 6         |
| 1.2.2 | OOP Concepts, Encapsulation               | 1. OOP pillars<br>2. Encapsulation<br>3. getter and setter   | 3         |
| 1.2.3 | Inheritance, base, static, sealed keyword | 1. Inheritance<br>2. base keyword<br>3. sealed class and methods<br>4. static class, static constructors   | 3         |
| 1.2.4 | Polymorphism, Aggregation                 | 1. Polymorphism<br>2. function and operator overloading<br>3. Overriding<br>4. Aggregation   | 3         |
| 1.2.5 | Abstraction, Interface                    | 1. Abstraction, abstract class<br>2. Interface<br>3. nested classes<br>4. partial class  | 6         |

|        |                                   |   |           |
|--------|-----------------------------------|---|-----------|
| 1.2.6  | Enum, struct va generic toifalari | 1. Enum<br>2. Generics<br>3. struct   | 3         |
| 1.2.7  | Collections(1-qism)               | 1. Systems.Collections<br>2. Array vs ArrayList<br>3. List, LinkedList, SortedList<br>4. Stack, Queue<br>5. Dictionary vs HashTable         | 6         |
| 1.2.8  | Collections(2-qism)               | 1. IEnumerable, ICollection, IList, IDictionary<br>2. Indexer<br>3. Iteration, yield operator   | 3         |
| 1.2.9  | Tuple va Nullable types           | 1. Tuple<br>2. ValueTuple<br>3. Nullable types<br>4. Null-coalescing operator   | 3         |
| 1.2.10 | Event va Delegate types           | 1. Delegate<br>2. Event<br>3. Anonymous methods<br>4. Lambda expression   | 9         |
| 1.2.11 | Amaliyot va oraliq nazorat        | Amaliyot va oraliq nazorat  | 4         |
| 1.3    | <b>C# advanced</b>                |   | <b>80</b> |
| 1.3.1  | Exception handling                | 1. Exceptions<br>2. try, catch, final<br>3. throw   | 3         |
| 1.3.2  | Working with text                 | 1. StringBuilder<br>2. Regex<br>3. String comparison  | 3         |
| 1.3.3  | Vaqt bilan ishlash                | 1. DateTime class<br>2. Date, DateOnly, TimeOnly<br>3. Timestamp  | 3         |
| 1.3.4  | File I/O                          | 1. File, FileInfo<br>2. StreamWriter, StreamReader<br>3. MemoryStream, FileStream<br>4. Directory, DirectoryInfo<br>5. DriveInfo<br>6. Path | 9         |

|   |            |                   |   |  |           |
|---|------------|-------------------|---|--|-----------|
| 2 |            | 1.3.5             | Object serialization, JSON                            | 1. JsonSerializer<br>2. XmlSerializer<br>3. BinaryFormatter  | 6         |
|   |            | 1.3.6             | MultiThreading, Parallel and Asynchronous programming | 1. MultiThreading<br>2. Asynchronous Programming<br>3. Paraller Programming  | 9         |
|   |            | 1.3.7             | Amaliyot va oraliq nazorat                            | Amaliyot va oraliq nazorat   | 4         |
|   | <b>2</b>   | <b>DATABASE</b>   |   |  | <b>80</b> |
|   | <b>2.1</b> | <b>PostgreSql</b> |   |  | <b>80</b> |
|   |            | 2.1.1             | PostgreSQL MOBT                                       | 1. Database<br>2. Database Management Systems (DBMS) (Postgresql, Oracle)<br>3. Database types(relational, nosql)<br>4. PostgreSQL and PgAdmin install<br>5. Tablespace, Schema, Table, User | 3         |
|   |            | 2.1.2             | Data types and Constraints                            | 1. Connect To a PostgreSQL Database<br>2. Server<br>3. Data types<br>4. Constraints => NOT NULL, UNIQUE, PK, FK, CHECK   | 3         |
|   |            | 2.1.3             | SQL so'rovlar tili, DDL, DML buyruqlari               | 1. DDL(CREATE, ALTER, TRUNCATE, DROP)<br>2. DML(INSERT, SELECT, UPDATE, DELETE)  | 3         |
|   |            | 2.1.4             | DSL, TCL, Build Structure                             | 1.. Build Structure(ONE to ONE, ONE to MANY, MANY to ONE, MANY to MANY)  | 3         |
|   |            | 2.1.5             | Opertorlar, PostgreSQL fundamentals                   | 1. Operators(Arithmetic, Comparison, Logic)<br>2. PostgreSQL fundamentals (select distinct, order by, where, limit, fetch, in, between, like, is null, table and column aliases)             | 3         |
|   |            | 2.1.6             | Joining Multiple Tables                               | 1. Joining Multiple Tables (join, cross join, natural join)<br>2. AGGREGATE FUNCTIONS (count, avg, max, min, sum)<br>3. Grouping Data (group by, having                                      | 6         |
|   |            | 2.1.7             | Extra fundamentals for table                          | 1. Subquery, ANY, ALL, EXISTS, Set<br>2. Operations (UNION, Intersect, Except)<br>3. CONDITIONAL EXPRESSIONS & OPERATORS (case, coalesce, nullif, cast)                                      | 3         |

|          |                     |  |  |            |
|----------|---------------------|--|--|------------|
|          | 2.1.8               | Viewlar bilan ishlash                    | 1. Views(Simple, Complex, Inline, Materialized)<br>2. Managing PostgreSQL Views(CREATE, DROP, UPDATABLE)   | 3          |
|          | 2.1.9               | Funksiyalar bilan ishlash                | 1. Functions(aggregate, math, String, Date)<br>2. SQL functions<br>3. PL/PgSql functions   | 6          |
|          | 2.1.10              | Triggers, Lock and Privileges            | 1. Triggers<br>2. Crypto<br>3. Lock  | 3          |
|          | 2.1.11              | Postgresql Advanced Features             | 1. JSON, JSONB<br>2. Indexing<br>3. Postgres Cron<br>4. CREATING TABLE PARTITIONS<br>5. Vertical table   | 6          |
|          | 2.1.12              | Kurs ishi va Oraliq nazorat              | Kurs ishi va Oraliq nazorat  | 3          |
|          |                     |  |  |            |
| <b>3</b> | <b>.NET Backend</b> |  |  | <b>320</b> |
|          | <b>3.1</b>          | <b>Working with Database. Frameworks</b> |  | <b>80</b>  |
|          | 3.1.1               | Introduction LINQ & Basic Linq operators | 1. Architecture of LINQ<br>2. Different Ways to write LINQ Query<br>3 .Differences between IEnumerable and IQueryable<br>4. Projection Operators<br>5. Ordering Operators<br>6. Filtering Operators<br>7. Set Operators<br>8. Quantifier Operators | 3          |
|          | 3.1.2               | LINQ Operators in C#                     | 1.Grouping Operators<br>2. Partitioning Operators<br>3. Equality Operators<br>4. Element Operators<br>5. Conversion Operators<br>6. Concatenation Operators  | 3          |
|          | 3.1.3               | LINQ Operators in C#                     | 1. Aggregation Operators<br>2. Generation Operators<br>3. Join Operators<br>4. Custom Sequence Operators   | 3          |

|       |                                   |   |          |
|-------|-----------------------------------|---|----------|
| 3.1.4 | Basics of <a href="#">ADO.NET</a> | <ol style="list-style-type: none"> <li>1. Introduction to ADO.NET</li> <li>2. Architecture of ADO.NET</li> <li>3. Data Providers in ADO.NET</li> <li>4. Connection Object in ADO.NET</li> <li>5. Command Object in ADO.NET</li> <li>6. DataReader Object in ADO.NET</li> </ol>  | <b>3</b> |
| 3.1.5 | ADO.NET Working with Data         | <ol style="list-style-type: none"> <li>1. DataAdapter Object in ADO.NET</li> <li>2. DataTable, DataColumn, DataRow Objects in ADO.NET</li> <li>3. DataSet Object in ADO.NET</li> <li>4. ADO.NET Using Stored Procedures</li> <li>5. DataView Object in ADO.NET</li> </ol>   | <b>3</b> |
| 3.1.6 | ADO.NET Advanced Concepts         | <ol style="list-style-type: none"> <li>1. Transactions in ADO.NET</li> <li>2. <a href="#">ADO.NET</a> Connection Pooling</li> <li>3. Bulk Insert Update in C# using Stored Procedure</li> <li>4. Connected and Disconnected Architecture in ADO.NET</li> <li>5. SQL Injection and Prevention in C#</li> <li>6. Projects with ADO.NET</li> </ol> | <b>6</b> |
| 3.1.7 | Dapper basics                     | <ol style="list-style-type: none"> <li>1. Dapper introduction</li> <li>2. Dapper Querying.Querying Scalar Values.<br/>Querying Single Row</li> <li>3. Querying Multiple Rows.Querying.<br/>Multiple Result.Querying.Specific Columns</li> <li>4. Executing Non-Query Command</li> <li>5. Executing Reader</li> </ol>                            | <b>3</b> |
| 3.1.8 | Dapper advanced                   | <ol style="list-style-type: none"> <li>1. Executing Stored Procedures</li> <li>2. Using Parameters</li> <li>3. Inserting Data with Dapper</li> <li>4. Inserting Data with Dapper Bulk</li> <li>5. Bulk Update, Delete, Merge with Dapper</li> <li>6. Project with Dapper vs ADO.NET</li> </ol>  | <b>3</b> |

|            |  |   |           |
|------------|--|---|-----------|
| 3.1.9      | Introduction to Entity Framework Core    | <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Installation</li> <li>3. Existing Database</li> <li>4. DbContext</li> <li>5. First Application</li> <li>6. Querying</li> <li>7. Saving Data</li> </ol>   | <b>6</b>  |
| 3.1.10     | EF working with modules                  | <ol style="list-style-type: none"> <li>1. Migration</li> <li>2. EF Core - Conventions</li> <li>3. One-to-One Conventions</li> <li>4. One-to-Many Conventions</li> <li>5. EF Core – Configurations</li> </ol>  | <b>3</b>  |
| 3.1.11     | SQL in Entity Framework                  | <ol style="list-style-type: none"> <li>1. EF Core - Fluent API</li> <li>2. Configure One-to-One Relationship</li> <li>3. Configure One-to-Many Relationship</li> <li>4. Configure Many-to-Many Relationship</li> <li>5. Disconnected Scenario: Insert Data</li> <li>6. Update Data</li> <li>7. Delete Data</li> </ol> | <b>6</b>  |
| 3.1.12     | Advanced Entity Framework Core Features  | <ol style="list-style-type: none"> <li>1. ChangeTracker</li> <li>2. Shadow Property</li> <li>3. Lazy vs Eager Loading</li> <li>4. Working with Disconnected Entity Graph</li> <li>5. Tracking Entity Graph</li> </ol>   | <b>3</b>  |
| <b>3.2</b> | <b>ASP.NET Core Web API Introduction</b> |   | <b>80</b> |
| 3.2.1      | Introduction to ASP.NET Core Web API     | <ol style="list-style-type: none"> <li>1. Introduction to REST</li> <li>2. What is ASP.NET Web API?</li> <li>3. First application</li> <li>4. Startup va Program filelari</li> </ol>  | <b>8</b>  |
| 3.2.2      | Controller, Action, Routing              | <ol style="list-style-type: none"> <li>1. Controller nima?</li> <li>2. Action bilan ishlash</li> <li>3. IActionResult, ActionResult</li> <li>4. Routing nima?</li> <li>5. Fallback routes</li> </ol>  | <b>8</b>  |

|            |  |   |           |
|------------|--|---|-----------|
| 3.2.3      | Middleware, Request pipeline, DI Container     | 1. Middleware nima?<br>2. Request pipeline<br>3. Dependency Injection<br>4. DI Container<br>5. Registering services | 8         |
| 3.2.4      | Global error handling and Logging              | 1. ILogger interfeysi<br>2. Serilog configuration<br>3. Error handling  | 8         |
| 3.2.5      | Model binding and validation                   | 1. Model binding<br>2. Model Validation<br>3. Handling validation errors  | 8         |
| 3.2.6      | CRUD operations                                | 1. Get metodi bilan ishlash<br>2. Post metodi bilan ishlash<br>3. Put va Patch metodlari<br>4. Delete metodi        | 12        |
| 3.2.7      | RESTful API with Repository Pattern            | 1. What is RESTful api?<br>2. Repository Pattern haqida<br>3. Implement RESTful api with RP                         | 12        |
| 3.2.8      | Filters, Sorting, Searching and Pagination     | 1. Filtering<br>2. Sorting<br>3. Searching<br>4. Pagination   | 8         |
| 3.2.9      | Object mapping                                 | 1. DTO nima?<br>2. AutoMapper<br>3. Mapster   | 4         |
| 3.2.10     | Amaliyot va oraliq nazorat                     | Amaliyot va oraliq nazorat  | 4         |
| <b>3.3</b> | <b>ASP.NET Core Web API, WebMVC additional</b> |   | <b>80</b> |
| 3.3.1      | OpenApi and Swagger. API Versioning            | 1. Configure Swagger<br>2. URL versioning<br>3. Http Header versioning<br>4. Deprecating Versions                   | 8         |
| 3.3.2      | Caching, Rate limiting                         | 1. Cache types<br>2. Cache-store, Expiration model, Validation model<br>3. Etag<br>4. Rate limiting                 | 8         |



|            |  |   |           |
|------------|--|---|-----------|
| 3.3.3      | CORS   | <ol style="list-style-type: none"> <li>1. What is CORS?</li> <li>2. Enabling CORS</li> <li>3. Setting CORS origins and HTTP methods</li> <li>4. Creating a custom CORS policy</li> </ol>  | 8         |
| 3.3.4      | ASP.NET Core MVC                               | <ol style="list-style-type: none"> <li>1. MVC haqida</li> <li>2. Views, Strongly typed views</li> <li>3. Layout, ViewStart, ViewImport</li> <li>4. Tag helpers</li> <li>5. Statik fayllar bilan ishlash</li> <li>6. Razor view</li> </ol> | 12        |
| 3.3.5      | Authentication with JWT                        | <ol style="list-style-type: none"> <li>1. Authentication</li> <li>2. JWT(JSON Web token)</li> <li>3. Authentication with JWT</li> </ol>   | 12        |
| 3.3.6      | ASP.NET Identity                               | <ol style="list-style-type: none"> <li>1. Create IdentityDbContext</li> <li>2. Register, Login, Logout</li> <li>3. Identity services</li> </ol>   | 8         |
| 3.3.7      | Cookies  | <ol style="list-style-type: none"> <li>1. What is Cookies?</li> <li>2. Setting and getting cookies</li> </ol>   | 8         |
| 3.3.8      | Authorization server with IdentityServer4      | <ol style="list-style-type: none"> <li>1. IdentityServer options</li> <li>2. Identity resource</li> <li>3. API scope, API resource, API client</li> <li>4. Authorization</li> </ol>   | 12        |
| 3.3.9      | Amaliyot va oraliq nazorat                     | Amaliyot va oraliq nazorat  | 4         |
| <b>3.4</b> | <b>ASP.NET Core Web API, WebMVC additional</b> |   | <b>80</b> |
| 3.4.1      | Coding Standards                               | <ol style="list-style-type: none"> <li>1. Clean Code</li> <li>2. Refactoring</li> </ol>   | 8         |
| 3.4.2      | Clean Design                                   | <ol style="list-style-type: none"> <li>1. SOLID</li> <li>2. DRY</li> <li>3. GoF</li> </ol>  | 12        |
| 3.4.3      | Software Testing                               | <ol style="list-style-type: none"> <li>1. Unit Testing</li> <li>2. AAA pattern</li> <li>3. FIRST pattern</li> <li>4. TDD</li> <li>5. Test Controllers</li> <li>6. Mock tests</li> </ol>   | 12        |
| 3.4.4      | Deploy to IIS Server                           | <ol style="list-style-type: none"> <li>1. IIS Server overview</li> <li>2. IIS Modules</li> <li>3. Publish to IIS</li> </ol>   | 8         |

|   |                                       |                        |                              |  |           |
|---|---------------------------------------|------------------------|------------------------------|--|-----------|
| 4 |                                       | 3.3.5                  | Azure                        | 1. Azure services<br>2. Publish and Deploy the app   | 8         |
|   |                                       | 3.3.6                  | Dockerizing ASP.NET Core app | 1. Create dockerfile<br>2. Docker container<br>3. Docker image<br>4. Docker hub  | 12        |
|   |                                       | 3.4.7                  | Devops                       | 1. What is CI/CD<br>2. Github actions  | 8         |
|   |                                       | 3.4.8                  | Agile, Jira, Trello          | 1. Agile<br>2. Jira<br>3. Trello   | 8         |
|   |                                       | 3.4.9                  | Amaliyot va oraliq nazorat   | Amaliyot va oraliq nazorat   | 4         |
|   | <b>Data Structures and Algorithms</b> |                        |                              |  | <b>80</b> |
|   | 4.1                                   | <b>Algorithms</b>      |                              |  | <b>32</b> |
|   |                                       | 4.1.1                  | Number Algorithms            | 1. Five Websites for DSA,<br>2. LeetCode Platform, LeetCode Problems<br>3. Power of Two<br>4. Valid Perfect Square   | 8         |
|   |                                       | 4.1.2                  | String Algorithms            | 1. Valid Anagram<br>2. Valid Parentheses   | 8         |
|   |                                       | 4.1.3                  | Array and Matrix Algorithms  | 1. Single Number<br>2. Move Zeros  | 8         |
|   |                                       | 4.1.4                  | Dynamic Programming          | 1. Fibonacci Number<br>2. Iterative Method<br>3. Recursive Method<br>4. Recursive-Make it work<br>5. DP-Make it efficient<br>6. Memoization-Top Down<br>7. Tabulation-Top Down<br>8. Coin Change 2 | 8         |
|   | 4.2                                   | <b>Data Structures</b> |                              |  | <b>48</b> |
|   |                                       | 4.2.1                  | Asymptotic Analysis          | Asymptotic Analysis  | 4         |
|   |                                       | 4.2.2                  | ArrayList and LinkedList     | ArrayList  | 8         |
|   |                                       | 4.2.3                  | Stack and Queue              | LinkedList   | 4         |
|   |                                       | 4.2.4                  | HashTable                    | HashTable  | 4         |
|   |                                       | 4.2.5                  | Tree                         | Tree   | 8         |

|   |          |                    |                    |    |
|---|----------|--------------------|--------------------|----|
|   | 4.2.6    | Trie               | Trie               | 4  |
|   | 4.2.7    | Graph (Directed)   | Graph (Directed)   | 8  |
|   | 4.2.8    | Graph (Undirected) | Graph (Undirected) | 8  |
| 5 | Amaliyot |                    |                    | 80 |