| Discipline | Programming Systems  code:22      summer semester |
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| Specialty | SOFTWARE AND INTERNET TECHNOLOGIES |
| ECTS credits: **5** | Form of assessment: Examination |
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| Department | SOFTWARE AND INTERNET TECHNOLOGIES |
| Faculty | Faculty of Computer Sciences and Automation |

Annotation: The course introduces students to the environment, technology and technology for application programming in the WINDOWS environment. The discipline examines:

- basic programming software under WINDOWS (message processing, menu operations, dialog and graphic elements, etc.), and

- tooling and programming tools for creating complex applications (DLL, COM, MFC, ATL, ActiveX and ODBC interface).

The course provides all special subjects from the curriculum of the specialty, using the knowledge of system programming in high-level languages (C, C ++) and forming a user interface in the Windows graphical operating environment: "Computer graphics", "Databases", "Operating Systems", "Technology of Programming", "Programming Technologies on the Internet" and part of the optional courses and the diploma project in creating Windows applications and the Internet.

Learning objectives:

- Organization of program components in WINDOWS
- WINDOWS Window Object Model, Event Programming, Message Exchange
- Basic WINDOWS concepts, resolving resources, dynamic libraries, program component interaction, RAM management
- Create custom dialog, resource editor, dialog elements
- Manage user dialogs, menus, dialog boxes, dialogs
- Device Context, Graphics, Keyboard and Mouse Control
- Principle of operation of complex controls: tree control, tabular control
- Creating and accessing dynamic libraries (DLLs)
- COM-modules, principle of operation, exemplary COM modules
- Libraries and modules for user dialogue management MFC, ATL, ActiveX
- Access to databases, ODBC interface, database management functions

| CONTENTS: | | |
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| Training Area | Hours lectures | Hours seminar exercises |

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| Instrumental tools for programming in WINDOWS environment. Object programming in WINDOWS environment. Objects. Processing and sending messages. Synchronization tools. WINDOWS Environment Architecture. Windows. Attributes. Types of messages. Message Manager. Key features of WINDOWS | 2 | |
| Object programming in WINDOWS environment. Objects. Polymorph and inheritance of objects in the WINDOWS environment. WINDOWS resource management. Managing RAM. Managing shared resources. | 2 | |
| Object programming in WINDOWS environment. Objects. Polymorph and inheritance of objects in the WINDOWS environment. WINDOWS resource management. Managing RAM. Managing shared resources. | 2 | |
| Instrumental tools. Compiler. Dynamic libraries. WINDOWS middleware applications. Structure of Win32 Application. Simple example window management program. | 2 | |
| Manage windows in WINDOWS. Working area. Device Context (GDI). Message processing (events) from keyboard, timer and mouse. Draw vector graphics, fill in areas, business graphics. Working with menus. Service function. Create, view, and modify menus. | 2 | |
| Resources: dialog boxes, dialogs. Language for resource definition Managing dialogs in Win32 application. Messaging, Dial Element Control (initialization, setting and learning of values). | 3 | |
| Interactive graphics and visual element management. Drag & Drop with the mouse, Mark and Drag Graphic Elements. Sample program for visual work in the work area of a graphical window. | 2 | |
| Access to the file system. File types. Files and Styles. Formatting and converting strings and strings. Seamless and direct access to file elements. | 2 | |
| Working with more complex controls in Windows: list (table) control and tree control | 3 | |
| WINDOWS programming technologies. Create dynamic libraries (DLLs) in WINDOWS environments. Imports and exports. Sample Simple DLL and DLL Client. | 2 | |
| MFC and ActiveX controls. Example program that includes standard ActiveX control. | 3 | |
| Component Object Model (COM), Essence, COM Interfaces. Registration of COM modules. Functions of COM Objects. | 3 | |

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| Active Template Library (ATL COM). Creating an ATL Client and an ATL Server Part | 2 | |
| Database management. ODBC interface. Record Set from base. Example application for access to an MS-ACCESS database. | 2 | |
| Integrated Windows programming environment. Operating modes. Project file setup, compilation, linking and execution. Test and program setup (Debug). Structure of Win32 Application. Simple example window management program. Icon, title line, cursor. | | 2 |
| Working with menus. Service function. Message processing, option manipulators. Create, view, and modify menus. Pop-Up menu. Example menu management program. | | 2 |
| Resources: dialog boxes, dialog boxes, icons, cursors, bit map, etc., Creating and editing, Working with resource editors. Example dialog box with different controls. Resources: dialog boxes, dialog boxes, icons, cursors, bit map, etc., Creating and editing, Working with resource editors. Example dialog box with different controls. | | 2 |
| Manage dialogs in Win32 application. Messages, dialog management features (initialization, setting and learning of values). Example Dialog Box Control Program. | | 2 |
| Processing of messages (events) from a keyboard, timer and mouse. Example format programs for text editing, timer management and mouse functions. | | 2 |
| Graphical Information Display, GDI (Graphical Device Interface), Standard Window Messages. Refresh the window work area. Draw vector graphics, fill areas. Sample Business Graphics. | | 2 |
| Interactive graphics and visual element management. Drag & Drop with the mouse, Mark and Drag Graphic Elements. Sample program for visual work in the work area of a graphical window. | | 2 |
| Access to the file system. File types. Files and streams. Formatting and converting strings and strings. Seamless and direct access to file elements. Example file manager. | | 2 |
| Working with more complex controls in Windows: list (table) control and tree control. Initialize, show, add, and delete items scrolling. Example program | | 2 |
| Create dynamic libraries (DLLs) in WINDOWS environments. Imports and exports. Sample Simple DLL and DLL Client. | | 2 |

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| Work with standard MFC ActiveX controls using the Wizard. An example program that includes standard ActiveX control, e.g. Calendar. | | 2 |
| Component Object Model (COM), COM Interfaces. Registration of COM modules. Working with MFC-Wizard to create COM objects. | | 2 |
| Understand the Active Template Library (ATL COM). Working with Wizard when creating an ATL client and an ATL server part. | | 2 |
| Database management. ODBC interface. Wizard for designing an application with DB access. Record Set from base. Example application for access to an MS-ACCESS database. | | 2 |
| Integrated Windows programming environment. Operating modes. Project file setup, compilation, linking and execution. Test and program setup (Debug). Structure of Win32 Application. Simple example window management program. Icon, title line, cursor. | | 2 |
| TOTAL:   60 h | **30** | **30** |