15.04.02 Technological Machinery and Equipment. Hydraulic and Pneumatic Automatic Systems and Machinery

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| **Discipline cluster I** | **Disciplines (modules)** | Period (semester) | ECTS cr |
| **1.B** | **Basic (mandatory) part** |  | **48** |
| 1.B.01 | Professionally-oriented foreign language | 1, 2 | 4 |
| 1.B.02 | Research methodology in machine building | 1 | 4 |
| 1.B.03 | Computer-aided simulation and design tools | 1 | 2 |
| 1.B.04 | Protection of intellectual property | 3 | 3 |
| 1.B.05 | Computer technologies in machine building | 2 | 5 |
| 1.B.06 | Project management | 4 | 3 |
| 1.B.07 | New structural materials | 3 | 2 |
| 1.B.08 | Microprocessor control systems | 4 | 3 |
| 1.B.09 | Design of power hydraulic drives of technological machinery and equipment | 3 | 4 |
| 1.B.10 | Additive technologies in manufacture of technological machinery and equipment | 2 | 2 |
| 1.B.11 | Pneumatic drive | 3 | 3 |
| 1.B.12 | Maintenance and repairof technological machinery and equipment | 3 | 4 |
| 1.B.13 | Safety and safe operation of technological machinery and equipment | 3 | 3 |
| 1.B.14 | Diagnostic operation and safety of drives of technological machinery and equipment | 1 | 3 |
| 1.B.14 | Special chapters of fluid and gas dynamics | 1 | 3 |
| **1.V** | **Variation part established by the educational process participants, including elective disciplines** |  | **33** |
| **1.V.М1** | **Profile (32958/32960): Automated hydraulic and pneumatic systems and units** |  | **20** |
| 1.V.М1.01 | A scientific workshop on hydraulic, vacuum and compressor engineering | 3, 4 | 4 |
| 1.V.М1.02 | Theory and design of hydro-pneumatic drive | 1, 2, 3 | 9 |
| 1.V.М1.03 | Special power hydraulic drives | 1 | 3 |
| 1.V.М1.04 | Hydraulic and pneumatic mechatronic systems | 2 | 4 |
|  | **Elective disciplines (modules)** |  | **13** |
| 1.V.М1.05.01 | Theory of control of hydro-pneumatic systems | 1, 2 | 6 |
| 1.V.М1.05.02 | Theory of transient processes in hydro-pneumatic systems | 1, 2 | 6 |
| 1.V.М1.06.01 | Fluid friction pumps | 1 | 3 |
| 1.V.М1.06.02 | Calculation and design of jet devices | 1 | 3 |
| 1.V.М1.07.01 | Multidimensional fluids and non-stationary effects in hydro-pneumatic systems | 4 | 4 |
| 1.V.М1.07.02 | Wave processes in hydro-pneumatic systems | 4 | 4 |
| **Discipline cluster II** | **Internship** |  |  |
| **2.B** | **Basic (mandatory) part** |  | **30** |
| **2.V** | **Variation part established by the educational process participants** |  | **30** |
| 2.V.М1.01 | Training internship (introductory practical training) | 2 | 3 |
| 2.V.М1.02 | Fieldinternship, technology(project-based) internship | 2 | 3 |
| 2.V.М1.03 | Fieldinternship, scientific research | 1, 3 | 18 |
| 2.V.М1.04 | Fieldinternship, pre-diploma internship, including scientific research | 4 | 6 |
| **Discipline cluster III** | **Final state academic assessment** |  | **9** |
| **3.М1** | **Profile (32958/32960): Automated hydraulic and pneumatic systems and units** |  | **9** |
| **3.М1.01** | Master’s graduation thesis | 4 | 9 |
| **ED** | **Elective disciplines** |  | **4** |
| ED.01 | Problems of computational fluid dynamics | 2 | 2 |
| ED.02 | Problems of computational gas dynamics | 3 | 2 |