Course Description

Discipline/Course: DESIGNING MICROPROCESSOR MEASURING DEVICES

The Basic Educational Program specialty: INSTRUMENTMAKING

The department of physical methods and quality control devices

Instructor: Evgeny M. Fedorov, PhD

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Learning Outcomes:

Getting knowledge of the principles of construction of measuring instruments based on microcontrollers and microprocessors;

at the level of reproduction:

- Hardware and software implementation of devices based on microprocessors and microcontrollers;
- Elementary practical methods of designing devices based on microcontrollers.

at the level of understanding:

- The architecture of measuring systems with microprocessors and the basis for constructing measuring systems based on them;
- The most widespread modern types of microcontrollers, their development tools and programming languages;
- Bases of algorithms for processing of measuring information in microcontroller;
- The process of designing information and measuring systems of devices and devices based on microprocessors and microcomputers;
- knowledge of programming languages, debugging and testing facilities, structure and features of the most common universal processors, microcontrollers, FPGAs and DSPs.

Practical skills:

- Work with debugging and testing tools in the design of microprocessor systems.
- Calculation and design of digital equipment
- Analysis of technological documentation provided by processors and microcontroller manufacturers.

Course Outline:

Theoretical section:

- MODULE 1 "General information about the process of designing microprocessor technology".
- MODULE 2 "The software and hardware used in the development of microprocessor-based information and measurement technology."
- MODULE 3 "Hardware and software implementation of some typical electronic nodes measuring microprocessor systems."

Practical section: The practical section includes three laboratory works on programming and course design

Course Delivery: one semester, 18 weeks

Prerequisites: “Information and measuring equipment and technologies of nondestructive testing“, “Non-destructive testing and diagnostics“,“Metrological support of measurements, control and diagnostics“

Co-requisites: “Digital signal processing”.

Final Assessment: exam, course project

Course Developer: Evgeny M. Fedorov, PhD