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| The title of the course | **Coordinate measuring technique** |
| Faculty | [Faculty of Mechanical Engineering and Computer Science](http://eng.ath.bielsko.pl/index.php/faculties/gerg) |
| The level of studies | Engineer (BSc) |
| Semester | Winter/summer |
| The form of classes and number of hours | Lecture/ Project |
| Language of instruction | English |
| The number of ECTS | 2 |
| Teacher | Dr hab. inż. Wojciech Płowucha, prof. UBB |
| The aims of the course  (maximum 500 characters) | The students get acquainted with the principle of coordinate measuring technology, the construction of coordinate measuring machines and role of coordinate measuring technique in quality management systems in industrial engineering. Get to know the design types of measuring machines (classical coordinate measuring machine and the measuring arm). Get familiar with the coordinate measuring machines control and evaluation software (e.g. Quindos, PC-DMIS, Calypso). Learn the principles of conducting and the design of the measurement process on CNC measuring machines. |
| The content of the course: main topics and key ideas | 1 The principle of coordinate measuring technique. Coordinate systems (Cartesian, cylindrical, spherical) 2. The elements/features that define a workpiece and their definitions (cylinder, cone, plane, sphere, torus, a simple circle, point). Parameterization of basic geometric elements/features. 3. The algorithms used in the software of measuring machines. Algorithms for calculation of associated features. 4. Relationships between objects (distance, angle) - definitions and algorithms. 5. Coordinate measurements of geometric dimensions and tolerances. 6. Measuring strategy. Operators of verification (perfect, optimized and simplified operator). 7. Procedures for calibration of CMMs in accordance with ISO 10360. 8. Documentation of measurement results. |
| Didactics methods | Lecture |
| Course requirements | Exam/presentation/attendance/seminar paper |
| Literature (basic and supplementary) | 1. Humienny Z. (red.): Geometrical Product Specification (GPS). Wydawnictwa Naukowo-Techniczne. Warszawa 2002  2. GUM: Guide to the Expression of Uncertainty in Measurement (JCGM 100:2008, GUM 1995 with minor corrections)  3. VIM3: International Vocabulary of Metrology (JCGM 200:2012, VIM 3rd edition, 2008, with minor corrections)  4. interactive resources: elearning.ath.bielsko.pl |
| The effects of the education   * knowledge * skills * social competences | - student has knowledge necessary to use the measuring apparatus and methods for estimating measurement uncertainty  - student is able to obtain information from literature, databases, and other sources  - student is aware of and understands the importance of non-technical (economic) aspects and effects of metrological activity and the associated responsibility for decisions |