

# Metrology, Standardization and Certification

## Course Overview for gr. 158L3A

<b>Level of study</b>	<b>Bachelor Degree</b>
<b>Workload</b>	<p><b>ECTS: 3</b>  <b>Total Hours: 126</b>  <b>Contact Hours: 48</b></p> <ul style="list-style-type: none"> <li>• <b>Lectures: 24</b></li> <li>• <b>Labs: 16</b></li> <li>• <b>Seminars: 8</b></li> </ul>
<b>Course Code</b>	53.55
<b>Semester</b>	<b>Summer</b>
<b>Prerequisites</b>	<i>Mathematics, Physics, Construction Materials Engineering</i>
<b>Course Objectives</b>	<i>To develop knowledge and understanding of tolerancing principles and inspection methods and instruments applied in mechanical engineering. The course also aims to develop the ability for technical communication via correct dimensioning on engineering drawings</i>
<b>Learning Outcomes</b>	<p><i>Will be able to:</i></p> <ul style="list-style-type: none"> <li>• <i>apply basic principles of the interchangeability;</i></li> <li>• <i>carry out linear and angular measurements;</i></li> <li>• <i>assign universal and special measurement instruments;</i></li> <li>• <i>carry out inspection of form and location deviations</i></li> </ul>
<b>Syllabus</b>	<ul style="list-style-type: none"> <li>• <i>Principles of Dimensional Tolerancing Interchangeability and Manufacturing Accuracy; Tolerance Zones; Types of Fits of Smooth Parts, Systems of Fit; Fits of Rolling Bearing, Key, Slit and Screw Thread Junctions; Tolerance Zones of Limit Gauges; Tolerancing of Cones and Wedges; Tolerancing of Gear Wheels;</i></li> <li>• <i>Principles of Geometric Tolerancing Form Deviations; Location Deviations; Composite Deviations; Maximum Material Condition.</i></li> <li>• <i>Surface Texture Roughness; Waviness.</i></li> <li>• <i>Design and Assembly Drawings, Indications on Drawings</i></li> <li>• <i>Tolerance Analysis</i></li> <li>• <i>Engineering Metrology Methods of Measurements, Gauge Blocks; Measuring Instruments and Devices;</i></li> <li>• <i>Standardisation and Certification</i></li> </ul>
<b>Labs</b>	<ol style="list-style-type: none"> <li>1. <i>Design and Application of Vernier Instruments</i></li> <li>2. <i>Design and Application of Micrometers</i></li> <li>3. <i>Design and Application of Dial Indicators</i></li> <li>4. <i>Inspection of a Limit Gauge</i></li> <li>5. <i>Measurement of the Basic Parameters of External Thread on a toolmaker microscope</i></li> <li>6. <i>Surface Finish</i></li> </ol>

	<i>7. Inspection of Gear Wheels</i>
<b>Practical works</b>	<p>1. <i>Tolerance zone and Limit Dimensions;</i>  2. <i>Fits of Smooth Parts;</i>  3. <i>Selective Assembling;</i>  4. <i>Fits of Rolling Bearing, Key and Slit JUNCTIONS;</i></p>
<b>Projects</b>	Calculation of interference fit, assignment of gear wheels, calculation of dimensional chain, key and splined joints, thread junction, calculation of interference probability for transition fit, assembly drawings of mechanism, design drawing of stepped shaft
<b>Assessment</b>	<i>Exam</i>
<b>Resources</b>	<ul style="list-style-type: none"> <li>• <i>Metrology, standardisation and certification: study aid / A. B. Kim; Tomsk Polytechnic University (TPU). — Tomsk: Tomsk Polytechnic University Publishing House, 2014. (<a href="http://www.lib.tpu.ru/fulltext2/m/2014/m258.pdf">http://www.lib.tpu.ru/fulltext2/m/2014/m258.pdf</a>)</i></li> <li>• <i>Technology of Mechanical Engineering, part 1: study aid / V. N. Kozlov; Tomsk Polytechnic University (TPU). — Tomsk: Tomsk Polytechnic University Publishing House, 2002.</i></li> <li>• <i>Manufacturing Engineering and Technology. Fifth edition. Serope Kalpakjian, Steven R. Schmid, 2006</i></li> <li>• <i>Geometric Dimensioning and Tolerancing for Mechanical Design. Gene Cogorno. Publisher: McGraw-Hill Professional. 2011</i></li> <li>• <i>H. Dagnall M.A. Exploring Surface Texture. Rank Taylor Hobson, 1980</i></li> <li>• <i>H. Dagnall M.A. Let's Talk Roundness. Rank Taylor Hobson, 1976</i></li> </ul>
<b>Instructors</b>	<p><i>Kim Alexey Bogowhich</i>  <a href="http://portal.tpu.ru/SHARED/b/BOGOWHICH">http://portal.tpu.ru/SHARED/b/BOGOWHICH</a>  <i>Kozlov Viktor Nikolaevich</i></p>