No. 7.

Course syllabus for Second cycle studies					
1.	**Course title**	Physics 2			
2.	**Code**	FTM2M3			
3.	**Study Program**	Clothing Design and Engineering			
4.	**Study program organizer (unit, institute, department, division)**	Faculty of Technology and Metallurgy, Ss. Cyril and Methodius University in Skopje			
5.	**Degree (first, second, third cycle)**	First			
6.	**Academic year / semester**	I/II	7.	**Number of ECTS**	7
8.	**Instructors**	Dr. Ivana Fabijanikj Sandeva, Assistant Professor			
9.	**Prerequisites for course enrollment**	Taken course: Physics 1			
10.	**Objectives of the course syllabus (competences):** Using the physical laws of modern physics in modeling and solving specific problems in engineering. **Acquired skills (competences):** • Explaining the basic principles of the special theory of relativity. • Applying Maxwell equations in electromagnetic waves. • Applying the laws of physical optics. • Explaining the physical principles of modern technological devices. • Explaining basic phenomena of atomic physics. • Explaining basic quantum mechanical principles. • Applying Schrodinger equation in basic systems. • Analysis of the structure of a solid body. • Explaining conductivity in metals. • Applying quantum mechanical principles in analysis of the electrical, magnetic and optical properties of a solid body. • Applying physical principles for studyng nanomaterials. • Explaining physical phenomena at the atomic and nuclear levels. • Applying physical principles and phenomena in optics, atomic and nuclear physics in various fields (electronics, automation, telecommunications, energy, medicine).				
11.	**Content of the course:** Special theory of relativity. Relativistic mechanics. Lorentz transformations. Relativistic energy and impulse. Electromagnetic waves. Maxwell's equations. Index of refraction, dispersion, absorption and polarization of EM waves. Polarization of light as an EM wave and Malus's law. Wave nature of light. Coherence. Jung's experiment. Interference. Interferometry, detection and measurement of small displacements. Diffraction and diffraction lattice. Light quantum. Photoelectric effect. Absorption, emission and spontaneous emission. Application in modern devices in the technique. Atomic physics. Bohr's model of the atom. Atomic spectra. X-ray radiation. Linear and continuous spectrum. Mosley's Law. Compton's effect. Application of X-rays. Quantum mechanics. Wave-particle duality. Quantum mechanical postulates. Heisenberg principle of uncertainty. Schrodinger equation and its solution for a free particle, a particle in a potential pit and through a potential barrier. Tunnel effect. Schrodinger equation for a hydrogen atom. Quantum numbers. Periodic table. Paul's principle. Solid state physics. Fermi-Dirac function of distribution. Free electron model. Fermi energy. Density of electronic states. Brillouin Zone. Conductivity of metals. Quantum theory of semiconductors. Electrical and magnetic properties of materials. Superconductivity. Quantum theory of polarization, diamagnetism, paramagnetism and ferromagnetism. New properties and behavior of materials at the quantum level (nanolevel). Examples and application of nanoscience and nanotechnologies in various branches of electronics, computer engineering, automation, robotics, to biology and medicine. Nuclear physics.				

<table>
<tr><td></td><td colspan="6">Composition of the atomic nucleus. Nuclear forces. Nuclear reactions. Nuclear energy, radiation and radiation protection. Application of nuclear physics in technology, energy and medicine.</td></tr>
<tr><td>12.</td><td colspan="6">Study methods: Lectures, presentations, numerical and laboratory exercises</td></tr>
<tr><td>13.</td><td colspan="2">Total available time</td><td colspan="4">210 hours</td></tr>
<tr><td>14.</td><td colspan="2">Allocation of available time</td><td colspan="4">2+4</td></tr>
<tr><td rowspan="2">15.</td><td rowspan="2">Teaching activities</td><td>15.1.</td><td colspan="3">Lectures-theoretical teaching</td><td>30 hours</td></tr>
<tr><td>15.2.</td><td colspan="3">Exercises (laboratory, practice classes), seminars, teamwork</td><td>45 hours</td></tr>
<tr><td></td><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td rowspan="3">16.</td><td rowspan="3">Other types of activities</td><td>16.1.</td><td colspan="3">Projects, seminar papers</td><td>30 hours</td></tr>
<tr><td>16.2.</td><td colspan="3">Individual tasks</td><td>30 hours</td></tr>
<tr><td>16.3.</td><td colspan="3">Homework and self-learning</td><td>75 hours</td></tr>
<tr><td rowspan="4">17.</td><td colspan="6">Grading system</td></tr>
<tr><td>17.1.</td><td colspan="4">Exams</td><td>10 points</td></tr>
<tr><td>17.2.</td><td colspan="4">Activity and participation</td><td>20 points</td></tr>
<tr><td>17.3.</td><td colspan="4">Final exam</td><td>70 points</td></tr>
<tr><td rowspan="6">18.</td><td rowspan="6">Grading criteria (points/grade)</td><td colspan="3">Up to 61 points</td><td colspan="2">5 (five) (F)</td></tr>
<tr><td colspan="3">From 61 to 69 points</td><td colspan="2">6 (six) (E)</td></tr>
<tr><td colspan="3">From 70 to 79 points</td><td colspan="2">7 (seven) (D)</td></tr>
<tr><td colspan="3">from 80 to 89 points</td><td colspan="2">8 (eight) (S)</td></tr>
<tr><td colspan="3">From 90 to 95 points</td><td colspan="2">9 (nine) (B)</td></tr>
<tr><td colspan="3">from 95 to 100 points</td><td colspan="2">10 (ten) (A)</td></tr>
<tr><td>19.</td><td>Prerequisites for taking the final exam</td><td colspan="5">Completed laboratory exercises</td></tr>
<tr><td>20.</td><td>Language in which lectures are conducted</td><td colspan="5">English</td></tr>
<tr><td>21.</td><td>Method for monitoring the quality of lectures</td><td colspan="5">Internal evaluation and surveys</td></tr>
<tr><td rowspan="9">22.</td><td colspan="6">LITERATURE</td></tr>
<tr><td rowspan="3">22.1.</td><td colspan="5">Compulsory literature</td></tr>
<tr><td>No.</td><td>Author</td><td>Title</td><td>Publisher</td><td>Year</td></tr>
<tr><td>1.</td><td>Hristina Spasevska, Margarita Ginovska, Verka Georgieva</td><td>Lectures in Physics 2</td><td>UKIM-FEEIT</td><td>2016</td></tr>
<tr><td rowspan="4">22.2.</td><td colspan="5">Additional literature</td></tr>
<tr><td>No.</td><td>Author</td><td>Title</td><td>Publisher</td><td>Year</td></tr>
<tr><td>1.</td><td>S. Thornton, E. Rex</td><td>Modern Physics for scientists and engineers</td><td>Tabernakul</td><td>2010</td></tr>
<tr><td>2.</td><td>P. Tipler</td><td>Physics for scientists and engineers</td><td>Worth Publishers</td><td>1999</td></tr>
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