

## Module Description

<b>Module name</b>	Semiconductor physics
<b>Module level, if applicable</b>	Bachelor of Physics
<b>Code, if applicable</b>	18H02133802
<b>Subtitle, if applicable</b>	-
<b>Course, if applicable</b>	-
<b>Semester(s) in which the module is taught</b>	5 <sup>th</sup>
<b>Person responsible for the module</b>	Prof. Dr. Paulus Lobo Gareso, M. Sc.
<b>Lecturer</b>	<ol style="list-style-type: none"> <li>1. Prof. Dr. Paulus Lobo Gareso, M. Sc.</li> <li>2. Prof. Dr. Dahlang Tahir, M. Si.</li> <li>3. Heryanto, S. Si, M. Si.</li> </ol>
<b>Language</b>	Indonesian Language [Bahasa Indonesia]
<b>Relation to Curriculum</b>	Undergraduate degree program, elective, 5 <sup>th</sup> semester
<b>Type of teaching, contact hours</b>	<p><b>Teaching methods</b> : [group discussion], [problem-based learning].</p> <p><b>Teaching forms</b> : [lecture], [tutorial].</p> <p>CH: 08.00 - 16.00</p>
<b>Workload</b>	<p>For this course, students are required to meet a minimum of 90.67 hours in one semester, which consist of:</p> <ul style="list-style-type: none"> <li>- 26.67 hours for lecture,</li> <li>- 32.00 hours for structured assignments,</li> <li>- 32.00 hours for private study</li> </ul>
<b>Credit points</b>	2 credit points (equivalent with 3.4 ECTS)

<b>Requirements according to the examination regulations</b>	Students have participated in at least 80% of the learning activities (Academic Regulations, Chapter VII). A student must have attended at least 75% of the lectures to sit in the exams.
<b>Recommended prerequisites</b>	-
<b>Module objectives/intended learning outcomes</b>	<p>After completing the course, Students are able:</p> <p><b>Intended Learning Outcomes (ILO):</b></p> <p><b>ILO 1 :</b> Students will have a relatively deep understanding in classical and basic quantum physics. [ILO 1 - Kn]</p> <p><b>ILO 3 :</b> Students are able to use the basic principles of physics in technology application. [ILO 3 - Kn]</p> <p><b>Course Learning Objective (CLO):</b></p> <p>After completing this course, students are expected to be able to</p> <ol style="list-style-type: none"> <li>1. Master the concept of semiconductor physics starting from atomic and crystal structures, direct and indirect semiconductor materials, semiconductor properties, followed by charge carrier transport and atomic diffusion.</li> <li>2. Describe the semiconductor diode and junction heterostructure.</li> <li>3. Explain the technique of growing epitaxy and semiconductor devices.</li> </ol> <p><b>Sub CLO :</b></p> <p>ILO 1 ⇒ CLO 1 : Using several quantities in Semiconductor Physics for atomic and crystal structures.</p> <p>ILO 3 ⇒ CLO 2 : Explain the difference between direct and indirect semiconductor materials.</p> <p>ILO 3 ⇒ CLO 3 : Explain the electron-hole transport due to the electric field and differences in electron-hole concentrations.</p> <p>ILO 3 ⇒ CLO 4 : Describe the mechanism of semiconductor charge carriers in diodes.</p> <p>ILO 3 ⇒ CLO 5 : Explain the process of growing epitaxy (thin film).</p> <p>ILO 3 ⇒ CLO 6 : Describe semiconductor devices.</p>
<b>Content</b>	<p>Students will learn about :</p> <ol style="list-style-type: none"> <li>1. Using several quantities in Semiconductor Physics for atomic and crystal structures</li> </ol>

	<ol style="list-style-type: none"> <li>2. Explain the difference between direct and indirect semiconductor materials</li> <li>3. Explain the electron-hole transport due to the electric field and differences in electron-hole concentrations</li> <li>4. Describe the mechanism of semiconductor charge carriers in diodes</li> <li>5. Explain the process of growing epitaxy (thin film)</li> <li>6. Describe semiconductor devices</li> </ol>
<b>Forms of Assessment</b>	<p>Assessment techniques: [performance], [written test].</p> <p>Assessment forms: [assignment], [presentation], [midterm exam], [final term exam].</p> <p>Assignment = 32.5%, Presentation = 27.5%, Mid term exam = 15% Final term exam = 25%</p> <p>CLO 1 =&gt; ILO 1: 14% (7% Assignment 1 number 1-2, 7% MID exam number 1) CLO 2 =&gt; ILO 3: 15% (7% Assignment 1 number 3-4, 8% Mid exam number 2-3) CLO 3 =&gt; ILO 3: 13.5% (8.5% Assignment 2, 5% Final number 1) CLO 4 =&gt; ILO 3: 19.5% (14.5% Presentation, 5% Final number 2-3) CLO 5 =&gt; ILO 3: 13% (13% Presentation) CLO 6 =&gt; ILO 3: 25% (10% Assignment 3, 15% Final term exam number 4)</p>
<b>Study and examination requirements and forms of examination</b>	<p><b>Study and examination requirements:</b></p> <ul style="list-style-type: none"> <li>- Students must attend 15 minutes before the class starts.</li> <li>- Students must switch off all electronic devices.</li> <li>- Students must inform the lecturer if they will not attend the class due to sickness, etc.</li> <li>- Students must submit all class assignments before the deadline.</li> <li>- Students must attend the exam to get a final grade.</li> </ul> <p><b>Form of examination:</b> Written exam: Essay</p>
<b>Media employed</b>	<p>Text book, Zoom, Gmeet, Video Conference, Video and PowerPoint Presentation. LED, Whiteboard, Learning Management System (SIKOLA).</p>

<b>Reading list</b>	<b>Main :</b> <ul style="list-style-type: none"><li>● Umesh K. Mishra and Jasprit Singh, Semiconductor Device Physics and Design, Springer.</li><li>● Donald A Neamen, Semiconductor Physics and Devices, McGraw Hill Company.</li></ul> <b>Support :</b> <ul style="list-style-type: none"><li>● P.L. Gareso, 2019, <i>Bahan Ajar Fisika Semikonduktor</i>, Departemen Fisika - FMIPA - Universitas Hasanuddin.</li></ul>
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