UIN SUNAN KALIJAGA YOGYAKARTA
FACULTY OF SCIENCE AND TECHNOLOGY
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**Undergraduate Programme in Physics**

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**MODULE HANDBOOK**

| | |
|---|---|
| Module Name | Statistical Physics |
| Module level, if applicable | Bachelor |
| Code, if applicable | FIS414039 |
| Subtitle, if applicable | - |
| Courses, if applicable | Statistical Physics |
| Semester(s) in which the module is taught | 6th (sixth) |
| Person responsible for the module | Andi, M.Sc. |
| Lecturer(s) | Andi, M.Sc |
| Language | Indonesia |
| Relation to curriculum | Compulsory course in the third year (6th semester) Bachelor Degree |
| Type of teaching, contact hours | 100 minutes lectures and 120 minutes structured activities per week. |
| Workload | Total workload is 90.6 hours per semester, which consists of 100 minutes lectures per week for 14 weeks, 120 minutes structured activities per week, 120 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam |
| Credit points | 2 |
| Requirements according to the examination regulation | Minimum attendance 75%<br>All assignments submitted<br>Attendance on time |
| Recommended prerequisites | No prerequisites stated on |
| Module objectives/intended learning outcomes | After completing this course, the students:<br>CO 1. Able to understand the concept of macroscopic and microscopic system characteristics<br>CO 2. Able to explain the thermodynamic quantities in each microcanonical, canonical, and grand canonical ensembles.<br>CO 3. Able to analyze Maxwell-Boltzman, Bose-Einstein and Fermi Dirac distribution functions and phenomena that show each distribution function. |
| Content | 1. Review the laws of thermodynamics<br>2. Entropy and Temperature<br>3. Thermodynamic Potential: Gibbs free energy, Helmholtz free energy, Enthalpy, Grand Potential<br>4. Introduction to statistical methods<br>5. Characterization of macroscopic and microscopic systems<br>6. Microcanonical, canonical, and grand canonical ensembles<br>7. Thermodynamic quantities on microcanonical, canonical, and grand canonical ensembles |

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<table>
<tr><td></td><td>8. Quantum statistics<br>9. Maxwell-Boltzman, Bose-Einstein, and Fermi Dirac distribution functions<br>10. Bose-Einstein condensation, Fermi gas degeneracy</td></tr>
<tr><td>Study and examination requirements and forms of examination</td><td>The final mark will be weighted as follows:
<table>
<tr><th>NO</th><th>Assessment methods (components, activities)</th><th>Weight (percentage)</th></tr>
<tr><td>1</td><td>Final Examination</td><td>40%</td></tr>
<tr><td>2</td><td>Mid-Term Examination</td><td>30%</td></tr>
<tr><td>3</td><td>Class Activities : Quiz, Homework, etc.</td><td>30%</td></tr>
</table>
The final assessment is expressed in the form of a letter value converted from a number value with the following categories:
<table>
<tr><th>NO</th><th>Number Value</th><th>Letter Value</th><th>NO</th><th>Number Value</th><th>Letter Value</th></tr>
<tr><td>1</td><td>≥ 95</td><td>A</td><td>7</td><td>65-69.99</td><td>B/C</td></tr>
<tr><td>2</td><td>90-94.99</td><td>A-</td><td>8</td><td>60-64.99</td><td>C+</td></tr>
<tr><td>3</td><td>85-89.99</td><td>A/B</td><td>9</td><td>55-59.99</td><td>C</td></tr>
<tr><td>4</td><td>80-84.99</td><td>B+</td><td>10</td><td>50-54.99</td><td>C-</td></tr>
<tr><td>5</td><td>75-79.99</td><td>B</td><td>11</td><td>55-34.99</td><td>D</td></tr>
<tr><td>6</td><td>70-74.99</td><td>B-</td><td>12</td><td><35</td><td>E</td></tr>
</table></td></tr>
<tr><td>Media employed</td><td>White-board, Lcd Projector, e-learning (https://daring.uin-suka.ac.id/)</td></tr>
<tr><td>Reading list</td><td>1. Statistical Mechanics, R.K.Pathria and P.D.Beale, 3rd edition, Elsevier<br>2. Thermodynamics, Kinetic Theory, and Statistical Termodynamics, F.W.Sears and G.L.Salinger, 3rd edition, Addison Wesley<br>3. Statistical Mechanics : Entropy, Order Parameters, and Complexity, J.P.Sethna, Oxford University Press<br>4. Statistical Physics, L.D.Landau and E.M.Lifshitz, 3rd edition, Pergamon Press</td></tr>
</table>

**PLO and CO Mapping**

| | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 |
|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | | √ | √ | | | | | | |
| **CO 2** | | √ | √ | | | | | | |
| **CO 3** | | √ | √ | | | | | | |