

<b>MATA KULIAH</b>  <b>COURSE</b>	<b>Nama Mata Kuliah</b> : Fisika I <b>Course Name</b> : <i>Physics 1</i>
	<b>Kode MK</b> : SF 184101 <b>Course Code</b>
	<b>Kredit / Credits</b> : 4 sks
	<b>Semester</b> : I

<b>DESKRIPSI MATA KULIAH</b> <b>Description of Course</b>
<p>Pada mata kuliah ini mahasiswa akan belajar memahami hukum-hukum dasar fisika, Kinematika partikel; Dinamika partikel; Kerja dan energi ; Gerak rotasi ; Getaran dan Mekanika fluida, melalui uraian matematika sederhana serta memperkenalkan contoh pemakaian konsep, dan melakukan analisa materi dalam bentuk praktikum.</p> <p><i>In this course, students will learn to understand the basic laws of physics, particle kinematics; Particle dynamics; Work and energy; Rotational motion; Vibration and fluid mechanics, through simple mathematical descriptions and introducing examples of the use of concepts, and analyzing material in the form of practicum.</i></p>

<b>CAPAIAN PEMBELAJARAN MATA KULIAH</b> <b>Course Learning Outcome</b>
<ul style="list-style-type: none"> <li>● Mahasiswa memahami besaran fisika dan sistem satuan, serta ciri besaran skalar dan besaran vektor</li> <li>● <i>Students understand physical quantities and unit systems, as well as the characteristics of scalar quantities and vector quantities</i></li>   <li>● Mahasiswa memahami definisi gerak putar dan gerak lurus secara visual dan matematis dan mampu menerapkannya kedalam penyelesaian soal</li> <li>● <i>Students understand the definitions of angular motion and linear motion visually and mathematically and are able to apply it to solving problems</i></li>   <li>● Mahasiswa mampu memahami rumus gerak parabolis dua dimensi dan menerapkannya kedalam menyelesaikan soal</li> <li>● <i>Students are able to understand the two-dimensional parabolic motion formula and apply it to solving problems</i></li>   <li>● Mahasiswa memahami prinsip dasar hukum-hukum Newton dan mampu menerapkan hukum Newton, dan gaya sentripetal dalam penyelesaian soal</li> <li>● <i>Students understand the basic principles of Newton's laws and are able to apply Newton's laws, and centripetal forces in solving problems</i></li>   <li>● Mahasiswa memahami azas kerja dan energi mekanik, hukum kekekalan energi mekanik, dan menerapkannya kedalam soal</li> <li>● <i>Students understand the principles of work and mechanical energy, the law of conservation of mechanical energy, and apply it to problems</i></li>   <li>● Mahasiswa mampu menerapkan azas impuls dan momentum, kekekalan momentum, tumbukan elastis dan tidak elastis kedalam penyelesaian soal</li> </ul>

- *Students are able to apply impulse and momentum principles, momentum conservation, elastic and inelastic collisions into problem solving*
- Memahami prinsip gerak benda tegar dan gerak menggelinding
- *Understand the principles of rigid body motion and rolling motion*
- Mampu menerapkan dalam penyelesaian soal
- *Able to apply in solving problems*
- Mahasiswa mampu memahami dan menerapkan kecepatan dan percepatan sudut, gerak rotasi, translasi, dan kesetimbangan benda tegar.
- *Students are able to understand and apply angular velocity and acceleration, rotational motion, translation, and rigid object equilibrium.*
- Mahasiswa memahami getaran harmonik, hukum Hooke pada elastisitas tarik dan puntir.
- *Students understand harmonic vibrations, Hooke's law on tensile and torsional elasticities.*
- Mahasiswa memahami peristiwa aliran fluida stasioner dan peranan viskositas pada aliran fluida.
- *Students understand the events of statistical fluid flow and the role of viscosity in fluid flow.*

#### **POKOK BAHASAN**

##### **Main Subject**

Besaran dan vektor;

**Kinematika partikel:** Pergeseran posisi, kecepatan, percepatan, gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif.

**Dinamika partikel:** Hukum Newton I, II dan III, macam-macam gaya (gaya gravitasi, gaya berat, gaya tegang tali, gaya normal, gaya gesek dan gaya pegas), kesetimbangan gaya, penerapan hukum Newton I, II dan III ;

**Kerja dan energi:** konsep kerja, energi kinetik, energi potensial (gravitasi dan pegas), teorema kerja energi, hukum kekekalan energi mekanik,

**Impuls dan Momentum :** impuls, momentum, tumbukan (elastis dan tidak elastis), pusat massa;

**Dinamika rotasi:** Pergeseran sudut, kecepatan sudut dan percepatan sudut, momen gaya (torsi), kesetimbangan momen gaya, momen inersia, energi kinetik rotasi, gerak menggelinding, hukum kekekalan energi (translasi dan rotasi)

**Getaran:** gerak harmonis sederhana, energi gerak harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (sejajar dan tegak lurus);

**Mekanika fluida:** tekanan hidrostatis, prinsip Pascal, prinsip Archimedes, tegangan permukaan, persamaan kontinuitas, persamaan Bernoulli, viskositas.

##### **Quantities and vectors;**

*Particle kinematics: displacement, velocity, acceleration, straight motion, curved motion (parabolic and circular); relative motion.*

**Particle dynamics:** *Newton's Laws I, II and III, various forces (gravitational force, gravity, rope tension, normal force, friction and spring force), force balance, application of Newton's laws I, II and III;*

**Work and energy:** *the concept of work, kinetic energy, potential energy (gravity and spring), work energy theorem, the law of conservation of mechanical energy,*

**Impulse and Momentum:** *impulse, momentum, collision (elastic and inelastic), center of mass;*

**Rotational dynamics:** *Angular displacement, angular velocity and angular acceleration, force moment (torque), force moment equilibrium, moment of inertia, rotational kinetic energy, rolling motion, energy conservation law (translation and rotation)*

**Vibration:** *simple harmonic motion, energy of simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular);*

**Fluid mechanics:** hydrostatic pressure, Pascal's principle, Archimedes principle, surface tension, continuity equation, Bernoulli's equation, viscosity.

**Prerequisites**

-

**PUSTAKA UTAMA**

**References**

1. Halliday, Resnic, Jearl Walker ; 'Fundamental of Physics'. John Wiley and Sons, 10<sup>th</sup> ed, New York, 2014
2. Douglas C. Giancoli, 'Physics for Scientists and Engineers , Pearson Education, 4<sup>th</sup> ed, London, 2014
3. Tim Dosen, "Diktat Fisika I", Fisika FMIPA-ITS
4. Tim Dosen, "Soal-soal Fisika I", Fisika FMIPA-ITS
5. -, "Petunjuk Praktikum Fisika Dasar", Fisika, MIPA-ITS

**PUSTAKA PENDUKUNG**

**Supporting References**

1. Sears & Zemanky, "University Physics", Pearson Education, 14<sup>th</sup>ed, USA, 2016
2. Tipler, PA, 'Physics for Scientists and Engineers ', 6<sup>th</sup> ed, W.H. Freeman and Co, New York, 2008