Silabus - BASIC SCIENCE

(*Syllabus*)

INSTITUT TEKNOLOGI SEPULUH NOPEMBER
KANTOR PENJAMINAN MUTU
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INSTITUT TEKNOLOGI SEPULUH NOPEMBER		
Syllabus Basic Science		
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1. SILABUS FISIKA I/ *Syllabus of Physics I*

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

DESKRIPSI MATA KULIAH *Description of Course*
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. 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.

CAPAIAN PEMBELAJARAN MATA KULIAH *Course Learning Outcome*
- Mahasiswa memahami besaran fisika dan sistem satuan, serta ciri besaran skalar dan besaran vektor   - Students understand physical quantities and unit systems, as well as the characteristics of scalar quantities and vector quantities   - Mahasiswa memahami definisi gerak putar dan gerak lurus secara visual dan matematis dan mampu menerapkannya kedalam penyelesaian soal   - Students understand the definitions of angular motion and linear motion visually and mathematically and are able to apply it to solving problems   - Mahasiswa mampu memahami rumus gerak parabolis dua dimensi dan menerapkannya kedalam menyelesaikan soal   - Students are able to understand the two-dimensional parabolic motion formula and apply it to solving problems

- Mahasiswa memahami prinsip dasar hukum-hukum Newton dan mampu menerapkan hukum Newton, dan gaya sentripetal dalam menyelesaian soal
- Students understand the basic principles of Newton's laws and are able to apply Newton's laws, and centripetal forces in solving problems
- Mahasiswa memahami azas kerja dan energi mekanik, hukum kekekalan energi mekanik, dan menerapkannya kedalam soal
- Students understand the principles of work and mechanical energy, the law of conservation of mechanical energy, and apply it to problems
- Mahasiswa mampu menerapkan azas impuls dan momentum, kekekalan momentum, tumbukan elastis dan tidak elastis kedalam penyelesaian soal
- 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 statisioner 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 hidrostatika, 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
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PUSTAKA UTAMA
References

1. Halliday, Resnic, Jearl Walker ; 'Fundamental of Physics'. John Wiley and Sons, 10th ed, New York, 2014
2. Douglas C. Giancoli, 'Physics for Scientists and Engineers , Pearson Education, 4th 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, 14thed, USA, 2016 2. Tipler, PA, 'Physics for Scientists and Engineers ',6th ed, W.H. Freeman and Co, New York, 2008	

2.   SILABUS FISIKA II/ *Syllabus of Physics II*

MATA KULIAH *COURSE*	Nama Mata Kuliah *Course Name*	:	Fisika II *Physics II*
	Kode MK *Course Code*	:	<mark>SF184202</mark>
	Kredit / *Credits*	:	3 sks
	Semester	:	II

DESKRIPSI MATA KULIAH Description of Course
Pada mata kuliah ini mahasiswa akan belajar memahami hukum-hukum dasar fisika, Medan Listrik; Potensial Listrik; Arus Listrik ; Medan magnet; Gaya Gerak Listrik (EMF) Induksi dan Arus Bolak Balik, melalui uraian matematika sederhana serta memperkenalkan contoh pemakaian konsep. In this course, students will learn to understand the basic laws of physics, the Electric Field; Electric Potential; Electric current ; Magnetic field; Electric Motion Force (EMF) Induction and Alternating Current, through simple mathematical descriptions and introducing examples of the use of concepts.

CAPAIAN PEMBELAJARAN MATA KULIAH Course Learning Outcome
• Mahasiswa memahami butir-butir penyusun materi serta sifat kelistrikannya, hakekat konduktor dan dielektrik. • Students understand the constituent points of the material as well as its electrical properties, conductor and dielectric nature. • Mahasiswa Memahami kuat medan listrik berdasarkan gaya coulomb dan hukum gauss • Students understand the electric field strength based on the coulomb force and Gauss law • Mahasiswa mampu memahami berbagai bentuk potensial listrik pada konduktor bermuatan • Students are able to understand various forms of electric potential in charged conductors • Mahasiswa Memahami azas kapasitansi berbagai bentuk kapasitor pada rangkaian kapasitor, seri, paralel dan campuran

- Students understand the capacitance principle of various capacitor forms in capacitor, series, parallel and mixed circuits
- Mampu menggunakan rumus gaya medan magnit terhadap arus listrik dan muatan bergerak
- Able to use the magnetic field force formula to electric current and moving charges
- Mampu menyebutkan peranan magnetisasi dalam material magnetik dan hystensis loop
- Be able to mention the role of magnetization in magnetic material and loop hystensis
- Memahami prinsip timbunya gaya gerak listrik, dan arus dalam resistor, kapasitor dan induktor
- Understand the principles of generating electromotive force and currents in resistors, capacitors and inductors
- Mampu menentukan besar impendansi, besar arus listrik, dan sudut fasa pada rangkaian seri, paralel R-L, R-C, R-L- C
- Able to determine impedance, amount of electric current, and phase angle in series, parallel R-L, R-C, R-L-C

POKOK BAHASAN
Main Subject

Muatan listrik, Hukum Coulomb;

Medan listrik: kuat medan listrik, garis gaya, perhitungan kuat medan listrik untuk muatan titik, muatan garis, cincin, piringan, silinder;

Hukum Gauss: fluks, garis gaya, Hukum Gauss dan aplikasinya untuk muatan silinder dan bola;

Potensial listrik: energi potensial, beda potensial listrik, hubungan potensial listrik dan medan listrik, perhitungan potensial listrik untuk muatan titik, muatan garis, cincin, piringan, silinder dan bola;

Kapasitor: Kapasitansi, perhitungan kapasitansi untuk kapisitor keping sejajar, kapasitor silinder dan kapasitor bola, rangkaian kapasitor seri dan paralel, bahan dielektrik, energi kapasitor;

Arus listrik: arus dan gerak muatan, hukum Ohm, resistivitas, resistansi, daya listrik;

Rangkaian arus searah: rangkaian resistor seri dan paralel, hukum Kirchoff;

Medan magnet: fluks dan induksi magnet, gaya Lorentz, hukum Biot Savard-Ampere, perhitungan medan magnet untuk kawat lurus berarus, cincin, solenoida dan toroida;

GGL Induksi : Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada induktor;

Gejala Transien: perhitungan perubahan arus terhadap waktu untuk rangkaian RC dan CL seri

Arus bolak balik: arus bolak-balik dalam resistor, induktor, kapasitor, Impedansi, rangkaian R-L dan R-C untuk seri dan pararel, R-L-C seri, Daya, Resonansi.

Electric charge, Coulomb's Law;

Electric field: electric field strength, line force, calculation of electric field strength for point charge, line charge, ring, disk, cylinder;

Gauss's Law: flux, lines of force, Gauss's Law and its application to cylindrical and spherical charges;

Electric potential: potential energy, electric potential difference, relationship between electric potential and electric field, calculation of electric potential for point charges, line charges, rings, plates, cylinders and spheres;

Capacitors: Capacitance, capacitance calculations for strip capacitors, cylindrical and ball capacitors, series and parallel capacitor circuits, dielectric materials, capacitor energy;

Electric current: current and motion of charge, Ohm's law, resistivity, resistance, electric power;

Direct current circuits: series and parallel resistor circuits, Kirchoff's law;

Magnetic fields: magnetic flux and induction, Lorentz forces, Biot Savard-Ampere law, computation of magnetic fields for straight-current wires, rings, solenoids and toroides;

Induced EMF: Faraday's Law, Lenz's Law, Induced EMF, Self-Inductance and Coupled Inductance; energy in the inductor;

Transient Symptoms: calculation of change in current with time for series RC and CL circuits

Alternating current: alternating current in resistors, inductors, capacitors, impedance, R-L and R-C circuits for series and parallel, R-L-C series, Power, Resonance.

Prerequisites
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PUSTAKA UTAMA References
1. Halliday & Resnic; 'Fundamental of Physics'. John Wiley and Sons, New York, 1987 2. Tim Dosen, "Diktat Fisika II", "Soal-soal Fisika II", Fisika FMIPA-ITS 3. Giancoli, DC., (terj, Yuhilza H), 'Fisika, jilid 2', Ertangga, Jakarta, 2001

PUSTAKA PENDUKUNG Supporting References
1. Alonso & Finn,"Fundamental University Physics", Addison Wesley Pub Comp Inc,13`.ed, Calf, 1990 2. Tipler, PA,(ted. L Prasetio dan R.W.Adi), "Fisika : untuk Sains dan Teknik, Jilid 2", Erlangga, Jakarta, 1998

3. SILABUS KIMIA/ *Syllabus of Chemistry*

MATA KULIAH	Nama Mata Kuliah Course Name	:	Kimia I Chemistry I
	Kode MK Course Code	:	SK184101
COURSE	Kredit / Credits	:	3 sks
	Semester	:	I

DESKRIPSI MATA KULIAH Description of Course
Matakuliah ini mempelajari prinsip prinsip dasar ilmu kimia meliputi teori atom, konfigurasi elektron, ikatan kimia, wujud zat dan perubahan fasa, reaksi kimia dan stoikhiomeri, Teori Asam Basa, Kesetimbangan Ionik dalam Larutan (Asam Basa, Kelarutan, Kompleks dan Pengendapan), Termodinamika Kimia, Kinetika Kimia dan Elektrokimia. This course studies the basic principles of chemistry including atomic theory, electron configuration, chemical bonds, the form of substances and phase changes, chemical reactions and stoichiomeri, Acid-Base Theory, Ionic Equilibrium in Solutions (Acid-Base, Solubility, Complexes and Precipitation), Chemical Thermodynamics. , Chemical and Electrochemical Kinetics.
CAPAIAN PEMBELAJARAN LULUSAN YANG DIBEBANKAN MATA KULIAH Learning Outcome

A.1. (CPL 1)	Memiliki kepribadian yang baik dan disiplin tinggi di dalam menyelesaikan tugasnya Have a good personality and high discipline in completing tasks
B.3. (CPL 5)	Bertanggungjawab pada pekerjaan sendiri dan dapat diberi tanggung jawab atas pencapaian hasil kerja organisasi Responsible for his own work and can be given responsibility for the achievement of the work of the organization
D.1. (CPL 8)	Mampu mengaplikasikan pola pikir kimia dan memanfaatkan IPTEK pada bidangnya dalam menyelesaikan masalah yang dihadapi Able to apply chemical mindset and take advantage of science and technology in their fields to solve existing problems

CAPAIAN PEMBELAJARAN MATA KULIAH Course Learning Outcome

1. Mahasiswa mampu menggunakan prinsip-prinsip dasar ilmu kimia sebagai dasar dalam mempelajari ilmu yang berkaitan dengan kimia.
2. Mahasiswa dapat melakukan perhitungan-perhitungan dasar kimia.

1. Students are able to use the basic principles of chemistry as a basis for studying science related to chemistry.
2. Students can perform basic chemical calculations.

POKOK BAHASAN
Main Subject

1. Konsep Dasar Kimia
2. Model dan Struktur Atom
3. Konfigurasi Elektron dan Ikatan Kimia
4. Wujud Zat dan Perubahan Fase
5. Stoikhiometri dan Reaksi Kimia
6. Larutan, Konsentrasi, Sifat Koligatif
7. Kesetimbangan Kimia
8. Teori Asam Basa
9. Kesetimbangan Ionik dalam Larutan (Asam Basa, Kelarutan, Kompleks dan Pengendapan)
10. Termodinamika Kimia
11. Kinetika Kimia
12. Elektrokimia

1. Basic Concepts of Chemistry
2. Model and Atomic Structure
3. Electron Configuration and Chemical Bonds
4. Form of Substance and Phase Change
5. Stoichiometry and Chemical Reactions
6. Solution, Concentration, Colligative Properties
7. Chemical Equilibrium
8. Acid-base theory
9. Ionic Equilibrium in Solutions (Acid-Base, Solubility, Complexes and Precipitation)
10. Chemical Thermodynamics
11. Chemical Kinetics
12. Electrochemistry

PRASYARAT
Prerequisites

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PUSTAKA
References

1. Tim Dosen Departemen Kimia, "Kimia 1", edisi kedua, Media Bersaudara, 2019.
2. Oxtoby, D.W., Gillis, H.P. and Campion, A., "Principles of Modern Chemistry", 7th Edition, Brooks/Cole, 2012.
3. Chang, R. and Goldsby, K., "Chemistry", 11th Edition, McGraw-Hill, USA, 2012.
4. Goldberg, D. E., "Fundamental of Chemistry", 4th Edition, McGraw-Hill Companies, 2007.