Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

GENERAL PHYSICS: PHYS-132

ACADEMIC YEAR 2014-2015

Course Specification

Institution: **University of Dammam-KSA**
College/Department : **Deanship of Preparatory Year & Supporting Studies / Basic Sciences Department**

A Course Identification and General Information

1. Course title and code: **General Physics (PHYS-132)**
2. Credit hours: **3 hours (1 lecture per week = 3 contact hours)**
3. Program(s) in which the course is offered: **College of Engineering**
4. Name of faculty member responsible for the course: **Dr. Nazih Yousef**
5. Level/year at which this course is offered: **Preparatory Year**
6. Pre-requisites for this course (if any): **Admission at the program**
7. Co-requisites for this course (if any): **-**
8. Location if not on main campus**: main campus (Building 500)**

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

It is expected that the student after studied a scheduled topics be able to:

A. Describes the natural phenomena using models, physical laws, and physics principles such as; description of the motion including speed-velocity-acceleration…, falling objects under the influence of gravity, projectiles motion, and Newton's laws of motion with their applications.

B. Uses scientific foundations in practical applications in order to realize the importance of physics in the modern world. Topics related to this idea are as follows; momentum and impulse, work and energy, circular motion, Kepler's laws of planetary motion, the gravitational force, rotational motion of solids, fluids and thermodynamics, electrostatic and the Coulomb's law of mutual force between two or more electric charges, electric current and designing of electrical circuits, magnetic field, the magnetic force, making waves, wave motion, optics, light waves and color, mirrors and lenses.

C. Apply knowledge, experience and gained skill in an innovative way to solve the physical problems relating to the affairs of everyday life, such as fluid and thermodynamics, electrostatic and the law of Coulomb, electrical circuits, magnetic field and magnetic force, wave motion and optics, light waves and color, mirrors and lenses.

D. Attention about accuracy, objectivity, analysis and investigation when addressing the physical issues.

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

A. The teaching strategy and the expected learning outcomes will be explained for the student at the beginning of the semester.

B. The PowerPoint presentations will be used to explain the topic and how we can use the hyperlinks as a tool to achieve that.

C. The laws and principles of physics and its relationship to natural phenomena that occur in our daily life will be highlighted in a clear and specific way.

D. The questions and exercises will be solved in such way to encourage and give the students the opportunity to participate in the classroom using different teaching strategies such as; debate, cooperative groups, discussions, writing reports and using work sheets.

E. **The learning technology with animations such as active figures and videos will be activated in order to increase the student's attention in the classroom and indeed their participation.**

F. **Multiple choice questions will be activated inside the lecture in order to get feedback from the students so that the instructor can evaluate the topic in the early stages and solve any difficulties if present.**

G. **Students will be encouraged to use e-learning sites like Blackboard and scientific websites on the Internet to learn more about the physical applications as they can communicate with the instructor at any time.**

H. **Students will be given homework's assignment to enhance the student's responsibility. In addition to, using cooperative groups will allow the exchange of knowledge between the students in the classroom.**

I. **Students will be asked to prepare precise topics previously to explain it in the classroom; this will enhance the lecturing skills for our students.**

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

The course aims to enable the student to describe physical phenomena in terms of models, laws and principles. It helps them recognize the operation of scientific principles in established practical applications to apply acquired knowledge, experience and skills to new situations in a novel manner. The purpose of this course is not to give students rigorous preparation necessary for physics majors, but to turn them on to a more perceptive view of physical reality by introducing them to the central ideas and principles. The course primarily aims at the development of critical thinking among the students through the physical concept studied at the high school. The topics include:

1. **The Newtonian Revolution: (Describing Motion).**
2. **Falling Objects and Projectile Motion.**
3. **Newton's Laws: Explaining Motion.**
4. **Circular Motion, the Planets, and Gravity.**
5. **Energy and Oscillations.**
6. **Momentum and Impulse.**
7. **Rotational Motion of Solid Objects.**
8. **Fluids and Heat: (The Behaviour of Fluids, Temperature and Heat).**
9. **Electricity and Magnetism: (Electrostatic Phenomena, Electric Circuits, Magnets and Electromagnetism).**
10. **Wave Motion and Optics: (Making Waves, Light Waves and Color, Light and Image Formation).**

1 Topics to be Covered		
Topic	No of Weeks	Contact hours
Introduction **Physics, the Fundamental Science**	**1**	**3**
Describing Motion **2.1 Average and Instantaneous Speed** **2.2 Velocity** **2.3 Acceleration** **2.4 Graphing Motion** **2.5 Uniform Acceleration**	**1**	**3**
Falling Objects and Projectile Motion **3.1 Acceleration Due to Gravity** **3.2 Tracking a Falling Object** **3.3 Beyond Free Fall: Throwing a Ball Upward** **3.4 Projectile Motion** **3.5 Hitting a Target**	**1**	**3**
Newton's Laws: Explaining Motion **4.2 Newton's First and Second Laws** **4.3 Mass and Weight** **4.4 Newton's Third Law** **4.5 Applications of Newton's Laws**	**1**	**3**
Circular Motion, the Planets, and Gravity **5.1 Centripetal Acceleration** **5.2 Centripetal Forces** **5.3 Planetary Motion** **5.4 Newton's Law of Universal Gravitation**	**1**	**3**
Energy and Oscillations **6.1 Simple Machines, Work, and Power** **6.2 Kinetic Energy** **6.3 Potential Energy** **6.4 Conservation of Energy** **6.5 Springs and Simple Harmonic Motion**	**1**	**3**
Momentum and Impulse **7.1 Momentum and Impulse** **7.2 Conservation of Momentum** **7.3 Recoil** **7.4 Elastic and Inelastic Collisions** **7.5 Collisions at an Angle**	**1**	**3**
Rotational Motion of Solid Objects **8.1 What is Rotational Motion?** **8.2 Torque and Balance** **8.3 Rotational Inertia and Newton's Second Law** **8.4 Conservation of Angular Momentum**	**1**	**3**

The Behaviour of Fluids **9.1 Pressure and Pascal's Principle** **9.2 Atmospheric Pressure and the Behavior of Gases** **9.3 Archimedes' Principle** **9.4 Fluids in Motion** **9.5 Bernoulli's Principle**	**1**	**3**
Temperature and Heat **10.1 Temperature and Its Measurement** **10.2 Heat and Specific Heat Capacity** **10.3 Joule's Experiment and the First Law of Thermodynamics** **10.4 Gas Behaviour and the First Law** **10.5 The Flow of Heat**	**1**	**3**
Electrostatic Phenomena **12.1 Effects of Electric Charge** **12.2 Conductors and Insulators** **12.3 The Electrostatic Force: Coulomb's Law** **12.4 The Electric Field** **12.5 Electric Potential**	**1**	**3**
Electric Circuits **13.1 Electric Circuits and Electric Current** **13.2 Ohm's Law and Resistance** **13.3 Series and Parallel Circuits** **13.4 Electric Energy and Power** **13.5 Alternating Current and Household Circuits**	**1**	**3**
Magnets and Electromagnetism **14.1 Magnets and the Magnetic Force** **14.2 Magnetic Effects of Electric Currents** **14.3 Magnetic Effects of Current Loops** **14.4 Faraday's Law: Electromagnetic Induction** **14.5 Generators and Transformers**	**1**	**3**
Making Waves **15.1 Wave Pulses and Periodic Waves** **15.2 Waves on a Rope** **15.3 Interference and Standing Waves**	**1**	**3**
Light Waves and Colour **16.1 Electromagnetic Waves** **16.2 Wavelength and Colour** **16.3 Interference of Light Waves** **16.4 Diffraction and Gratings**	**1**	**3**

Light and Image Formation **17.1 Reflection and Image Formation** **17.2 Refraction of Light** **17.3 Lenses and Image Formation** **17.4 Focusing Light with Curved Mirrors**	**1**	**3**

2 Course components (total contact hours per semester):			
Lecture: **48 hours**	Tutorial: lecture	Practical/Fieldwork/Internship:	Other: Extra classes before final exam.

3. Additional private study/learning hours expected for students per week. (This should be an average: for the semester not a specific requirement in each week)

The student needs to study at least 4 hours per week (64 Hours per semester)

The student needs 8 hours at the end of semester as a revision for the whole syllabus.

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

(i) Description of the knowledge to be acquired

A course designed to develop the:

A. The students can understand the physical phenomena that occur in our daily life via the laws of physics such as the laws of gravity, motion, thermodynamics, electricity, magnetics and waves including sound and light.

B. **Use mathematical formulation to describe the principles or physical phenomena and analyzed on a scientific basis.**

C. **Students can apply what they have learned from the principles and rules in order to interpret the physical phenomena of their environment. This course covers topics in the fields of mechanics and other subfields of physics such as thermal physics, and electrical phenomena, waves, light and physical applications. These threads meet the basic requirements of the natural sciences physical interest to students of engineering track.**

(ii) Teaching strategies to be used to develop that knowledge

- **Demonstrating the basic information and principles through lectures and the achieved applications.**
- **Discussing phenomena with illustrating pictures and diagrams.**
- **Using the cooperative groups for knowledge exchange between the students.**
- **Debate is one of the strategies that we focus on.**
- **Lecturing method:**
  - **Blackboard**
  - **PowerPoint Presentation.**
  - **E-learning.**
  - **Solved Selected Problems with Discussion**
  - **Animations (active figures and videos).**
  - **Multiple choice questions**.

(iii) Methods of assessment of knowledge acquired

- **Solve some examples during the lecture.**
- **Exams:**
  - **Quizzes: Three short Quizes.**
  - **Two major-exams.**
  - **Homework.**
  - **Final Exam.**
- **Discussions with the students.**
- **Ask the student to clear the misunderstanding of some physical principle.**
- **Ask quality question**.

b. Cognitive Skills

(i) Cognitive skills to be developed

Improve the skills of thinking and perception of the student so that they may have the ability to do the following:

1. **Apply some basic principles and laws of physics in solving physics problems.**
2. **Derive and justify the common phenomena from the standpoint of physics.**
3. **Uses the scientific method to understand and analyse the problem and then implemented what he learned from the foundations of physics in the design and formulation of the solution.**
4. **Simplify the physical problems in the language of mathematics equations in order to understand these problems.**

(ii) Teaching strategies to be used to develop these cognitive skills

Preparing PowerPoint lectures that including: presentations, Animations and multiple choice questions. Homework exercises in which students are asked to explain phenomena or work simple numerical exercises are also collected and discussed.

(iii) Methods of assessment of students cognitive skills

Course grades are determined by a point system based upon quizzes, tests, homework, and in-class exercises. Discussion for simplify or analyse some phenomena.

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

Work as independently and as groups in classroom and take up responsibility.

(ii) Teaching strategies to be used to develop these skills and abilities

- **A. Teach the students how to use information technology and scientific sites in the internet.**
- **B. Teach students how to cover missed lectures.**
- **C. Teach students how to summarize lectures or to collect materials of the course.**
- **D. Teach students how to solve the difficulties in learning: problem solving - to strengthen educational skills.**
- **E. Encourage students to attend lectures.**
- **F. Teaching the students how to prepare precise topics to be explained later by them in the class room.**

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

- **Quizzes and Exams.**
- **Discussion.**
- **Clickers: multiple choice questions at the end of each lecture.**
- **Results from the cooperative groups in the class room.**

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

The students can use Blackboard and internet.

(ii) Teaching strategies to be used to develop these skills

Display the lecture note and homework assignment at the web of the course and at the blackboard. In addition to research assignments given to the students as a part of their evaluation.

(iii) Methods of assessment of students numerical and communication skills

Homework's assignment solutions assignment's Comments, via blackboard.

e. Psychomotor Skills (if applicable): none applicable

(i) Description of the psychomotor skills to be developed and the level of performance required

(ii) Teaching strategies to be used to develop these skills

(iii) Methods of assessment of students psychomotor skills

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	**Quiz 1**	**4th week**	**5**
2	**Exam 1**	**6 th week**	**10**
3	**Quiz 2**	**8 th week**	**5**
4	**Exam2**	**12 th week**	**10**
5	**Quiz 3**	**14 th week**	**5**

6	**Homework's**	**Every 5 weeks**	**5**
7	**Research assignments**		**10**
8	**Final Exam**	**End of semester**	**50**

D. Student Support

Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

3 hours per week for each section.

E. Learning Resources

1. Required Text(s)

Physics of Everyday Phenomena: A Conceptual Introduction to Physics, 7th Edition, by W. Thomas Griffith and Juliet Brosing, Published by McGraw-Hill.

2. Essential References

Conceptual Physics Fundamentals (Paul G. Hewitt)

3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

4-.Electronic Materials, Web Sites etc

https://highered.mcgraw-hill.com/sites

5- Other learning material such as computer-based programs/CD, professional standards/regulations

PowerPoint lectures

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)
   - **Lecture room.**
   - **Internet.**

2. Computing resources
   - **Computer.**
   - **Scientific calculator.**
   - **Data show.**

3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach

list)

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on **Effectiveness of Teaching** **Due to student feedback when solving different homework's and assignments.**
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department **Making questioner including all the students and observing the results.** **Making an international evaluation from other resources.**
3 Processes for Improvement of Teaching **Through searching for the most updated books and courses and getting last updates from global publishers.**
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) **This type of evaluation provides a comprehensive image of the achievements from each member in the section.**
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. **Observing the participation of students in the lectures and their reactions.** **Periodic meetings of the same section members to exchange different remarks on the syllabus and their own notes**