

**MULTIMEDIA UNIVERSITY OF KENYA**

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 ***Leader in Innovative Technology***

**FACULTY OF SCIENCE AND TECHNOLOGY**

**DEPARTMENT OF PHYSICS**

**COURSE OUTLINE**

 **SPL 2111: MECHANICS**

**(RET, AOL, CNTRL)**

UNIT CODE: SPL 2111 UNIT NAME: Mechanics

LECTURER’S NAME: Joyce Thairu CONTACTS: jthairu@mmu.ac.ke, 0733368974

**Course Objectives**

At the end of the course, the learner should be able to:

1. Solve simple problems on kinetics, kinematics and dynamics of particles and rigid bodies
2. Derive various scientific formulae for gravitation, elasticity, momentum, circular motion and energy
3. Apply physical concepts in solving multidisciplinary problems

**Content Summary**

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| Lecture/ Week | Course content | Remarks |
| 1 | Units and dimensional analysis* Physical quantities
* Dimensional analysis
* calculations
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| 2 | **Vector analysis*** vectors and scalars
* scalar and vector products
* scalar and vector fields
* gradient
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| 3 | * divergence
* curl
 |  |
| 4 & 5 | **Mechanics*** Linear Motion: displacement, velocity, acceleration
* force and Newton’s laws of motion, momentum, impulse, motion with constant velocity, constant and variable acceleration
* graphical representation of v-s, s-t, a-t diagrams and their uses
* work and energy: Mechanical energy: K.E and P.E, Conservation of energy
* conservation laws
* conservative forces
* projectile motion
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| 6 | CAT I |  |
| 7 & 8 | * Uniform circular motion centripetal force, tangential and centripetal acceleration for any arbitrary curvilinear motion
* Relationship between linear and angular motion equations
* Moment of Inertia - rotation of rigid bodies
* angular momentum and torque
* Rotational Kinetic energy
 |  |
| 9 | CAT II |  |
| 11 &12 | * Gravitational field and potential.
* Gravitation and Kepler's Laws
* Static and dynamic equilibrium
 |  |
| 13& 14 | Revision |  |
| 15 | Exams |  |

**Assessment Mode:**

Students Performance will be assessed through continuous assessment tests, assignments, and laboratory experiments that will account for 30 %

End of semester exam will account for 70 %.

Staff performance: A questionnaire at the end of each semester for students to fill and self-evaluation

**REFERENCES**

### Core Reading Materials:

#### Course Textbooks

1. Young H.D. Freedman R.A. and Ford L. (2007). *University Physics with Modern Physics with Mastering Physics*, (12th Ed.). Benjamin Cummings. ISBN-13: 978-0805321876
2. Ohanian H.C., and Markert J.T. (2007). *Physics for Engineers and Scientists*, (3rd Ed.). W.W. Norton & Co Ltd. ISBN-13: 978-0393929690
3. Mircea S.R, and Stuart B.P. (2006). *Advanced University Physics,* (2nd Ed.). CRC Press. ISBN-13: 978-1584885115

#### Course Journals

1. *IEEE Transactions on Magnetics,* IEEE Magnetics Society. ISSN: 0018-9464
2. *Journal of Applied Physics,* American Institute of Physics. ISSN: 0021-8979
3. *Journal of Physics: Conference Series (JPCS),* IOP Publishing. ISSN: 1742-6596

### Reference Materials:

#### Reference Textbooks

1. Abraham R., and Marsden J.E. (2008). *Foundations of Mechanics, (2nd Ed.).* Amer Mathematical Society. ISBN-13: 978-0821844380
2. Douglas C.G. (2008). *Physics for Scientists & Engineers with Modern Physics,* (4th Ed.) Addison-Wesley. ISBN-13: 978-0131495081
3. Spencer A.J.M (2004). *Continuum Mechanics.* Dover Publications. ISBN-13: 978-0486435947

#### Reference Journals

1. *Canadian Journal of Physics,* NRC Research Press. ISSN: 0008-4204
2. *Annals of Physics,* Elsevier. ISSN: 0003-4916
3. *Journal of Advances in Physics,* Taylor & Francis. ISSN: 1460-6976

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**Approved for use: Sign: (Dean, FoST** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**Date**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_