**PHYSICS 302: Advanced Mechanics. Fall 2013**

**Class time:** MWF 10:20-11:10 a.m., room MPHY 213

**Mid-term exam 1:** Thursday, October 3, 7:00-9:00 p.m.
**Mid-term exam 2:** Thursday, November 7, 7:00-9:00 p.m.
**Final exam:** Tuesday, December 10, 8:00-10:00 a.m.

**Instructor:** Dr. Alexey Belyanin  
(979) 845-7785, Room 426 MIST  
Email: belyanin@tamu.edu  
http://faculty.physics.tamu.edu/belyanin/  
**Office hours:** anytime when I am in the office

**Required text:** John R. Taylor, Classical Mechanics, University Science Books,  

**Recommended text:** L.D. Landau and E.M. Lifshitz, Mechanics, 3rd edition

Additional materials will be handed out in class as supplement and posted.

**Prerequisites and Co-requisites:** freshman mechanics, e.g. PHYS 218 or equivalent, calculus, and differential equations

**Tentative schedule and topics to be covered in the fall semester:**

**Weeks 1-4:** Review of Newton’s laws
- Notions of space and time from Aristotle to Einstein. Space and time in Newtonian Mechanics
- Newton’s third law and conservation of momentum. Rocket motion.
- Selected problems on the motion of point particles: air resistance, charged particles in electric and magnetic fields
- Kinematics in cylindrical coordinates. Angular momentum
- Work-energy theorem. Energy conservation
- Potential energy
- One-dimensional motion, central forces
- Virial theorem

**Weeks 5-8:** Lagrangian mechanics
- Calculus of variations
• Hamilton’s principle
• Lagrange’s equations
• Generalized coordinates
• Ignorable coordinates and conservation laws
• Constrained systems

Weeks 9-14: Applications of Lagrange’s equations

• Two-body central-force problems
• Particle collisions and scattering
• Noninertial frames

Policy and grading:
• Attendance is required. Your active participation in class discussion is encouraged.
• Homework assignments will be distributed each week. You can discuss the homework problems among yourselves, but the write up must be your own.
• There will be two mid-term exams and the final exam. Note that mid-terms will be held in the evenings.
• Grading: 20% homework, 25% each mid-term exam, 30% final exam

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Room B118 of Cain Hall, or call 979-845-1637.

Aggie Honor Code

“An Aggie does not lie, cheat, or steal or tolerate those who do.” (See the Honor Council Rules and Procedures on the web at http://www.tamu.edu/aggiehonor.)