Syllabus

Boise State Spring 2016 -- PHYS 341 Mechanics

1. **Instructor** -- Prof. Brian Jackson -- http://www.astrojack.com
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   Office hours: Mondays and Wednesdays, 4:30 -- 5:30p or by appointment

2. **Summary**
   PHYS 341 Mechanics is an advanced course in classical mechanics. I plan to cover Newtonian mechanics, oscillations, Lagrangian mechanics, orbital motion, non-inertial frames, rotational kinematics, and Hamiltonian mechanics.

   Regular class meetings will consist mainly of lecture with mathematical derivations and qualitative reasoning, along with class discussions and working problems in groups. Final grades will be based on homework, exams, and in-class quizzes. There will be one opportunity for extra credit.

   As a general rule, late assignments will not be accepted, but I understand you have lives outside of class. If you anticipate difficulty submitting an assignment on time, please contact me as soon as possible.

   If you are having trouble with the course, tests, homework, anything, just let me know. I'm a very reasonable guy, and I will make any accommodations I can that do not unfairly advantage a student. Please do NOT wait to tell me you're struggling. Contact me before things get out of hand.

3. **Class Website**
   https://sites.google.com/site/bsu2016phys341

4. **Regular Meeting Time and Place**
   2016 Jan 11 -- Apr 29
   Mondays, Wednesdays, and Fridays, 3:00 -- 4:15p
   Riverfront Hall, room 102B

5. **Textbook**
   Taylor's Classical Mechanics -- required

6. **Grading**
   Grades will be curved, but not handing in work will not lower the curve and will be detrimental to your final grade.

   Grades from coursework will be weighted as follows:
   - Homework -- 40%
   - In-Class Quizzes -- 10%
   - Mid-Term Exam -- 20%
   - Final Exam -- 30%.

   The following thresholds represent the minimum numerical grade required for a particular final letter grade and may change by semester's end:

A	90%
B	80%
C	70%
D	60%
F	<60%

   If you'd like to estimate your letter grade, download this spreadsheet and enter grades.

7. **Coursework**
    1. **Homework**
    Homework will be almost entirely taken from the textbook and will be assigned most weeks on Friday, posted online. The assignments will consist of problems applying the ideas from class and your readings and will usually be due at the start of class on the following Friday. Solutions to each homework will be posted after the assignments have been handed in at the same website.

    HW 1 is an exception. It will be assigned on the first day of class, ***Jan 11***, and is due the very next ***Friday, Jan 15***.

    Each problem I grade will receive between zero and five points -- zero indicates the problem wasn't even attempted, five indicates the problem was completely correct, and numbers in between for varying degrees of completion and correctness. Each homework will be worth 15 points.

    If you are unable to attend class to turn in your hard-copy, paper assignment, you may (1) hand it to me in my office, (2) slip it under my door, or (3) give it to a friend to turn in at lecture. I will NOT accept homework turned in late, e-mailed to me, or put in my mailbox in the Physics Office except by prior arrangement.

    2. **In-Class Quizzes**
    I will take attendance, but it won't be counted toward your grade. However, we will have ten short in-class quizzes based on the assigned readings at random times throughout the semester. Each quiz will be worth 5 points and graded in the same way as homework problems.

    3. **Mid-Term Exam**
    There will be one mid-term exam in class on ***Friday, Mar 11***. It will be worth 100 points.

    4. **Final Exam**
    The final exam will be cumulative and on ***Wednesday, May 4, 12:30 -- 2:30p*** in the usual classroom (RFH102B). It will be worth 150 points.

    5. **Extra Credit**
    Students may submit a video demonstrating one of the homework or test problems for extra credit, equivalent to one homework assignment, 15 points. The video must be e-mailed to me by class time on the last day of regular class, ***Apr 29***. I will not accept late extra-credit assignment under any circumstances. The videos will likely be posted on Youtube, so be sure to let me know if you don't want something posted.

8. **Academic Integrity**
All students are required to adhere to Boise State University's *Student Code of Conduct* on academic dishonesty. Assignments you submit must be your original work and cannot be used in other courses. Nor can you use significant portions of assignments completed for another course in this course.

    Assignments you submit must be original and developed by you. You are welcome to get ideas from other sources and work together; however, you must interpret such ideas significantly and cite your sources. Anything copied from a source (even the textbook) must be indicated by appropriate citations. Please refer to *Student Code of Conduct* Sections on Academic Dishonesty, Cheating, Classroom Misconduct, and Plagiarism.

    Bottom line: please be honest, and contact me if you have any questions.

9. **Accommodating Disabilities**
Students with disabilities needing accommodations to fully participate in this class should contact the Disability Resource Center (DRC). All accommodations must be approved through the DRC prior to being implemented. To learn more about the accommodation process, visit the DRC's website -- drc.boisestate.edu/students/getting-started/.

10. **University Support of Student Well-Being**
    Boise State is committed to the safety and well-being of our college students, faculty, and staff. You can help to identify and assist members of our community who may be at risk. If you are concerned about the behavior or safety of a member of the campus community or are in need of support yourself, please share your concerns with the CARE team by submitting a report of concern at care.boisestate.edu. When in doubt, reach out!

    The Women's Center at Boise State also offers confidential, no-cost support to any student who may be experiencing personal, financial, or academic road blocks. Additionally, they provide specialized support to students who identify as LGBTQIA and provide advocacy to victims of stalking, sexual assault, and gender-based violence. If you or someone you care about could use support, visit womenscenter.boisestate.edu for more information or to schedule an appointment.

11. **Relevance to the Physics GRE**
    Note that 20% of your score on the Physics Graduate Record Exam (GRE), a test that many graduate programs require, involves classical mechanics.

    Here's what the classical mechanics portion of the Physics GRE will cover: kinematics, Newton's laws, work and energy, oscillatory motion, rotational motion about a fixed axis, dynamics of systems of particles, central forces and celestial mechanics, three-dimensional particle dynamics, Lagrangian and Hamiltonian formalism, non-inertial reference frames, elementary topics in fluid dynamics.

12. **Class Schedule**
    The following represents the planned topics and dates and is subject to change throughout the semester:

Date		Topics	Textbook Sections	HW due
1/11/2016	M	Syllabus, Space and Time, Mass and Force, Newton's First and Second Laws, Inertial Frames	1.1, 1.2, 1.3, 1.4	
1/13/2016	W	Third Law, Momentum Conservation, Newton's Second Law in Cartesian, 2-D Polar Coordinate	1.5, 1.6, 1.7	
1/15/2016	F	Discuss HW 1		HW 1
1/18/2016	M	NO CLASS -- MLK DAY		
1/20/2016	W	Air Resistance, Linear Air Resistance, Trajectory in a Linear Medium, Quadratic Air Resistance	2.1, 2.2, 2.3, 2.4	
1/22/2016	F	Motion of Charge in Uniform B Field, Complex Exp, Solution for Charge in B field	2.5, 2.6, 2.7	HW 2
1/25/2016	M	Momentum Conservation, Rockets, Center of Mass	3.1, 3.2, 3.3	
1/27/2016	W	Angular momentum of one and many particles	3.4, 3.5	
1/29/2016	F	Kinetic Energy and Work, Potential Energy and Conservative Forces	4.1, 4.2	HW 3
2/1/2016	M	Potential Energy	4.3, 4.4	
2/3/2016	W	Time-Dependent Pot E, E in 1-D Linear Sys	4.5, 4.6	
2/5/2016	F	Curvilinear 1-D Sys	4.7	HW 4
2/8/2016	M	Central Forces, Spherical Coords, Interaction Energy of Two and Many Particles	4.8, 4.9, 4.10	
2/10/2016	W	Hooke's Law, Simple Harmonic Motion	5.1, 5.2	
2/12/2016	F	2-D Oscillators, Damped and Damped, Driven Oscillations	5.3, 5.4, 5.5	HW 5
2/15/2016	M	NO CLASS -- Presidents' Day		
2/17/2016	W	Resonance, Fourier Series and Solution for the Driven Oscillator	5.6, 5.7, 5.8	
2/19/2016	F	Review for Mid-Term Exam		HW 6
2/22/2016	M	Mid-Term Exam		
2/24/2016	W	Review Mid-Term		
2/26/2016	F	Intro to Calculus of Variations, The Euler-Lagrange Eqn and Applications	6.1, 6.2, 6.3	HW 7
2/29/2016	M	E-L Eqn in Many Variables	6.4	
3/2/2016	W	Lagrange's Eqns for Unconstrained Systems, Constrained Systems example	7.1, 7.2	
3/4/2016	F	Constrained Sys in general, Examples of Lagrange's Eqns	7.3, 7.4, 7.5	HW 8
3/7/2016	M	Generalized Momenta	7.6	
3/9/2016	W	Conservation Laws	7.7, 7.8	
3/11/2016	F			HW 9
3/14/2016	M	Two-Body Central Force Motion, Reduced Mass, Eqn of Motion	8.1, 8.2, 8.3	
3/16/2016	W	Energy and Eqn of Orbit	8.4, 8.5	
3/18/2016	F			HW 10
3/21/2016	M	NO CLASS -- Spring Break		
3/23/2016	W	NO CLASS -- Spring Break		
3/25/2016	F	NO CLASS -- Spring Break		
3/28/2016	M	Keplerian and Unbounded Orbits	8.6, 8.7	
3/30/2016	W	Changes of Orbits	8.8	
4/1/2016	F	Non-inertial Reference Frames, Tides	9.1, 9.2	HW 11
4/4/2016	M	Rotating Reference Frames	9.3, 9.4, 9.5	
4/6/2016	W	Coriolis and Centrifugal Forces	9.6, 9.7, 9.8	
4/8/2016	F	Foucault Pendulum	9.9	HW 12
4/11/2016	M	Angular Momentum and Center of Mass of Extended Bodies, Rotation about a Fixed Axis	10.1, 10.2	
4/13/2016	W	Moment of Inertia Tensor	10.3	
4/15/2016	F	Principal Axes of Inertia, Precession	10.4, 10.5, 10.6	HW 13
4/18/2016	M	Euler's Eqns	10.7, 10.8	
4/20/2016	W	Euler Angles, Lagrangian Treatment of a Spinning Top	10.9, 10.10	

4/22/2016	F	Dynamics of the Tippe Top		HW 14
4/25/2016	M	The Basic Variables of the Hamiltonian, 1-D and N-D Hamiltonian	13.1, 13.2, 13.3	
4/27/2016	W	Ignorable Coordinates, Lagrangian vs. Hamiltonian	13.4, 13.5	
4/29/2016	F	Phase-Space Orbits, Examples, Review for Final Exam	13.6	HW 15
5/4/2016	W	Final Exam from 12:30p to 2:30p in usual classroom		