

- Instructor:** Hongbo Joshua Yang
Office: REIC 110; E-mail: hyang20@alaska.edu
- Time:** Lectures: Mondays, Wednesdays, and Fridays, 1:00 pm - 2:00 pm (March 30 – May 5)
- Place:** REIC 207
- Office Hours:** Mondays, Wednesdays @ REIC 110, 10:15 pm - 11:15 pm, or by appointment.
- Credits:** 1 credits, 3 hours/week of lecture
- Recommended Textbooks:** *No textbook is required.*
- Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles** by Robert Eisberg and Robert Resnick, Wiley; 2nd edition (1985), ISBN-13 047187373X, ISBN-13: 978-0471873730.
- Introduction to Nuclear and Particle Physics** by A. Das and T. Ferbel, World Scientific Publishing; 2nd edition (2003), ISBN-13: 978-9812387448.
- Course Description** This course covers the phenomenology and experimental foundations of particle and nuclear physics including the fundamental forces and particles and composites.
- I. Nuclear masses and nuclear sizes; alpha, beta, and gamma radiation; interaction of ionizing radiation with matter. Kinematics of decays and reactions.
 - II. Microscopic pictures of nuclear physics. Nuclear forces; simple models of nuclear structure; theories of alpha, beta, and gamma radiation.
 - III. Beyond nuclear physics. Quarks and leptons as basic constituents of matter. Brief introduction to the Standard model: electroweak interactions, QCD.

Grading Policy:

Homework	50%
Paper Report	20%
<u>Final</u>	<u>30%</u>
Total	100%

The maximum score for each homework will be 100 points. A solution (homework, exam) that presents nothing more than a restatement of the problem will receive zero credit. Credit will be given for clarity of presentation; *illegible work will not be graded. To pass the course with a grade higher than an "F", you need 50% of the total credits. Grades A - D are assigned equal weight (units of 12.5%) for total credits between 50% and 100%. +/- are assigned 2.5% from grade boundary. So A+ (>97.5), A(>90), A- (>87.5), B+(>85), B(>77.5), B- (>75), C+ (>72.5), C (>65), C- (>62.5), etc.*

Homework:

On the average, problems will be assigned each week on Wednesdays. The homework will be due by the following Wednesday 1:00 PM. **All homework assignments must be turned in directly to me in class.** No emailed or otherwise electronically-submitted assignments will be accepted. *Late homework will not be accepted.*

Paper Report:

Find a paper on nuclear/particle physics from *Nature*, *Science*, or *Scientific American* (between 1980 and 2017), and write a two-page report/summary on it. By **April 9**, a copy of selected paper must be handed in before the class (5 points). The report is due on **April 23** before class (15 points). *Late submission will not be accepted.*

Exams:

A one-hour in-term final examinations will be held in class on **April 30 (Monday), 1:00 pm - 2:00 pm**. The exam will be closed books and closed notes. No calculators, computers, or communication devices are allowed.

Student Code of Conduct:

You are expected to submit work that is your own and properly acknowledge the work of others. You are responsible for understanding and adhering to the **Student Code of Conduct** that is printed in the UAF Course Catalog. Abide by it. Violations of the Code will be reported to the Dean of Students.

Disabilities Services:

If applicable, it is your responsibility to arrange for these services. The UAF Center for Health and Counseling provides services for UAF students with disabilities to ensure equal access to educational opportunities. The Center's Disability Services Program ensures compliance with §504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990. If you believe you are eligible for 504 and/or ADA accommodations, please contact them at 474-7043 (WHIT 203).

Title IX:

University of Alaska Board of Regents have clearly stated in BOR Policy that discrimination, harassment and violence will not be tolerated on any campus of the University of Alaska. If you believe you are experiencing discrimination or any form of harassment including sexual harassment/misconduct/assault, you are encouraged to report that behavior. If you report to a faculty member or any university employee, they must notify the UAF Title IX Coordinator about the basic facts of the incident. Your choices for reporting include: 1) You may access confidential counseling by contacting the UAF Health & Counseling Center at 474-7043; 2) You may access support and file a Title IX report by contacting the UAF Title IX Coordinator at 474-6600; 3) You may file a criminal complaint by contacting the University Police Department at 474-7721.

Tentative Weekly Schedule			
Week	Date	Lecture Subject	Homework
11	F Mar 30	Intro	
12	M Apr 2	Properties of nucleus, binding energy /nucleon	
	W Apr 4	Liquid drop model + weizsaecker formula	
	F Apr 6	Fermi gas model, magic numbers	Homework 1 is Due
13	M Apr 9	Radioactivity (alpha, beta, little gamma)	Paper Selection is Due
	W Apr 11	Natural radioactivity	
	F Apr 13	Fission 1	Homework 2 is Due
14	M Apr 16	Fission 2	
	W Apr 18	Fusion	
	F Apr 20	Quarks and leptons (SpringFest)	Homework 3 is Due
15	M Apr 23	Standard model: electroweak interactions, QCD	Paper Report is Due
	W Apr 25	Neutrino physics	
	F Apr 27		Homework 4 is Due
16	M Apr 30	1 – 2 pm, Final Exam	