PHYS 424: Particle Physics
PHYS 506A: Particle Physics I
January 2015 - April 2015

Instructor: Prof. Michel Lefebvre
Office: Elliott 205A
Phone: +1 250 721-7706
Email: lefebvre@uvic.ca
Web: https://www.uvic.ca/science/physics/vispa/people/faculty/lefebvre.php

Lectures: 10:30 - 11:50, Tuesday and Friday, in Elliott 160
First lecture: Tuesday 6 January 2015.

Course web: http://coursespaces.uvic.ca

Text: Introduction to Elementary Particles, 2nd edition, David Griffiths.
One copy in the Library Reserve call number "pri 16779".

Office Hours: Elliott 205A	Tuesday	14:30 - 16:30
	Wednesday	14:30 - 15:30

Keys to success

- Attend lectures.
- Read the text.
- Do assignments.
- Work on your project.

Course material

Course material will be distributed via the University's http://coursespaces.uvic.ca web site. This includes any slides shown in class, a detailed probable schedule of lectures and associated readings, and notes pointing to other useful resources.

Topics covered

This course will be an overview of particle physics, leading to topics of current research interest, such as CP violation, the Higgs boson and neutrino oscillations. The course will start with an overview of elementary particle dynamics, followed by a review of special relativity. We will then discuss symmetries, including a review of angular momentum in quantum mechanics. We will then address the calculation of decay rates and scattering cross sections through the use of the Feynman diagrams. This will then be applied to quantum electrodynamics, quantum chromodynamics, and the weak interaction. If time permits, we will discuss gauge theories and the structure of the Standard Model of particle physics, including the role of the Higgs boson and close with a discussion of neutrino oscillations and physics beyond the Standard Model.

Required course

Prerequisite: PHYS 423 or permission from the Department.
If you do not satisfy this requirement, please contact the instructor.

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Marking and Grades

To obtain credit in the course you must attempt and submit material for all evaluated components, and have at least 50% on your final mark which is obtained with the following marking scheme:

Assignments	30%	approximately 6 or 7 assignments
Project	30%	slides and presentation components
Final exam	40%	3 hour exam, April Exam Period

The final grade follows the Physics and Astronomy scheme for conversion of numerical scores to letter grades as closely as possible:

A+	90-100	B+	77-79	C+	65-69	F	0-49
A	85-89	B	73-76	C	60-64		
A-	80-84	B-	70-72	D	50-59	N	Not Complete

If the application of this scheme would result in grades that are judged by the instructor to be inconsistent with the University's grading descriptions, then the instructor will assign percentages consistent with them. Supplemental exams are not offered for this course, and hence the grade E will not be assigned. The grade N is a failing grade that indicates that you did not complete the required course work.

Calculator

You may only use a non-programmable, non-graphing calculator for exams. Examples of acceptable calculators are the Sharp EL-510R or EL-510RNB; they can be bought in the UVic Bookstore for about $10.

Arrangements and Conduct

The instructor is willing to arrange reasonable accommodations for:

- missed exams due to illness or severe affliction;
- missed assignments or course deadlines due to illness or other affliction;
- conflicts between classes or examinations, and religious observances;
- issues documented through RCSD;
- other issues.

If you miss an exam for any reason, you are expected to contact the instructor as soon as possible after the exam. If you anticipate missing a course requirement, you are expected to contact the instructor a reasonable amount of time in advance.

Cheating, plagiarism, ad other form of academic fraud are taken very seriously by the University and by the instructor. Please familiarize yourself with the Policy on Academic Integrity which can be found in the Undergraduate Calendar.

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Final Exam
You can bring your textbook, assignments and personal notes to the final exam. Make sure you have your textbook for the exam.

Other potentially useful references
- Mark Thomson, Modern Particle Physics, Cambridge University Press, 2013.
  - This is an excellent modern text suitable for senior undergraduate and M.Sc. level.
- IJR Aitchison and AJG Hey, Gauge Theories in Particle Physics, Institute of Physics Publishing, 3rd edition
  - This is a two-volume advanced text suitable for M.Sc. and Ph.D. level
- Ta-Pei Cheng and Ling-Fong Li, Gauge theory of elementary particle physics, Oxford science publication.
  - This is a classic advanced text on gauge theories, and it includes a useful introduction to group theory for Lie groups.
- Howard Georgi, Lie Algebras in Particle Physics, Westview press.

Tentative Schedule (last update 22 Mar 2015)

Date	Lecture Title	Text reference
Jan 6	Introduction	Chapter 1
Jan 9, 13	Elementary Particle Dynamics	Chapter 2
Jan 16, 20, 23	Relativistic Kinematics	Chapter 3
Jan 27, 30	Symmetries	Chapter 4
Feb 3, 6	Symmetries	Chapter 4
Feb 9-13	READING BREAK	
Feb 17	Symmetries	Chapter 4
Feb 20, 24, 27	The Feynman Calculus	Chapter 6
Mar 3, 6, 10	Quantum Electrodynamics	Chapter 7
Mar 13, 17, 20	Quantum Chromodynamics	Chapter 8
Mar 20, 24	Weak Interactions	Chapter 9
Mar 24, 27, 31	Project presentations	