

*Policy about course outlines can be found in Section 23.4 (2) of the University Calendar*

## University of Alberta

# PHYS 485 Introductory Particle Physics Section B01 Winter Term 2010

**Instructor:** Prof. Doug Gingrich  
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**Office Hours:** 2:00-3:00 Tuesdays and 3:30-4:00 Wednesday; or by appointment; or take a chance and drop-in if my door is open (do not knock if closed)

**Lecture Room & Time:** CEB 1-23, 11:00-12:20 Tuesdays and Thursdays

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**Course Description:** Particles and forces; relativistic kinematics; symmetries and conservation laws; bound states; heavy flavours, and the quark model; Dirac equation and the electrodynamics of leptons; electrodynamics of quarks and the parton model; quantum chromodynamics and the strong interactions; weak interactions and electroweak unification.

**Course Prerequisites:** PHYS 472, 351; MATH 337 or equivalent and MATH 121 or 225.

**Course Objectives:** Understand the language and basic concepts of particle physics; be able to calculate simple tree-level Feynman diagrams of QED processes; have an appreciation for what particle physics is as a field of research.

**Key to Success:** Attend classes; do problem sets; read textbook.

**Lecture Schedule & Assigned Readings:** Please read the Introduction and Chapter 1 on your own.

<b>Week</b>	<b>Dates</b>	<b>Topic</b>	<b>Readings</b>
1	5 Jan	Relativistic Kinematics	Chapter 3
1	7 Jan	Relativistic Kinematics	Chapter 3
2	12 Jan	Elementary Particle Dynamics	Chapter 2
2	14 Jan	Elementary Particle Dynamics	Chapter 2
3	19 Jan	Symmetries	Chapter 4
3	21 Jan	Symmetries	Chapter 4
4	26 Jan	Symmetries	Chapter 4
4	28 Jan	Feynman Calculus	Chapter 6
5	2 Feb	Feynman Calculus	Chapter 6

5	4 Feb	Quantum Electrodynamics	Chapter 7
6	9 Feb	Quantum Electrodynamics	Chapter 7
6	11 Feb	<i>Midterm Exam</i>	
7	16 Feb	<i>Reading Week</i>	
7	18 Feb	<i>Reading Week</i>	
8	23 Feb	Quantum Electrodynamics	Chapter 7
8	25 Feb	Quantum Electrodynamics	Chapter 7
9	2 Mar	Quantum Electrodynamics	Chapter 7
9	4 Mar	Hadron Production in $e^+e^-$ Collisions	Chapter 8
10	9 Mar	Weak Interactions	Chapter 9
10	11 Mar	Weak Interactions	Chapter 9
11	16 Mar	Weak Interactions	Chapter 9
11	18 Mar	Gauge Theories	Chapter 10
12	23 Mar	Gauge Theories	Chapter 10
12	25 Mar	Gauge Theories	Chapter 10
13	30 Mar	Gauge Theories	Chapter 10
13	1 Apr	Gauge Theories	Chapter 10
14	6 Apr	Neutrino Oscillations	Chapter 11
14	8 Apr	Beyond Standard Model	

**Required Textbook:** “Introduction to Elementary Particles”, David J. Griffiths, Wiley-VCH, ISBN 978-3-527-40601-2 (note: second, revised edition is required).

**Recommended or Optional Learning Resources:** See course website.

**Past Evaluation Material:** The previous years midterm and final exam will be posted on eClass.

**Grade Evaluation:** A distribution system will be used; the grades will be scaled following the University recommended distribution of grades.

<u>EXAMS</u>	<u>WEIGHTING</u>	<u>DATE</u>
Problem Sets	30%	
Midterm Exam	31%	Feb. 11
Final Exam	39%*	Apr. 23**

\*There is no possibility of a re-examination in this course.

\*\*WARNING: Students must verify this date on BearTracks when the Final Exam Schedule is posted.

**Assigned Problems Sets:** 8 problem sets, each consisting of 6 problems, will be assigned throughout the semester. The problem sets are due at 4:30 p.m. Late submissions will not be accepted. Please put them in the box that is marked PHYS 485 in the entrance to the Centre for Particle Physics (CEB 4-45). Do not put them under my door or in my mailbox. Solutions will be posted in eClass.

**Format of Midterm Exam:** 11:00-12:20 11 February in room CEB 1-23. The midterm exam will cover the first 4 chapters in textbook. No aids allowed (no books, notes, formula sheets, calculators, cell phones, etc.) besides pencils, pens, rulers, and erasers.

**Format of Final Exam:** 9:00-12:00 April 23 in room CEB 1-23. The final exam will cover all the material presented in the lectures. No aids allowed (no books, notes, formula sheets, calculators, cell phones, etc.) besides pencils, pens, rulers, and erasers.

**Missed Term Exams and Assignments:** Late assignments will not be accepted and will be given a grade of zero. A student who cannot write a term examination or complete a term assignment because of an incapacitating illness, severe domestic affliction or other compelling reasons can apply for deferral of the midterm weight to the final exam or extension of time to complete an assignment. Deferred of term work is a privilege and not a right; there is no guarantee that a deferral will be granted. Misrepresentation of facts to gain a deferral is a serious breach of the *Code of Student Behaviour*.

**Deferred Final Examination:** A student who cannot write the final examination because of an incapacitating illness or is suffering from severe domestic affliction or other compelling reasons can apply for a deferred final examination. Such an application must be made to the student's Faculty office within 48 hours of the missed examination and must be supported by a Statutory Declaration (*in lieu* of a medical statement) or other appropriate documentation (Calendar section 23.5.6). Deferred examinations are a privilege and not a right; there is no guarantee that a deferred examination will be granted. Misrepresentation of Facts to gain a deferred examination is a serious breach of the *Code of Student Behaviour*.

*Winter term deferred exams have been scheduled for Monday June 7, 2010 from 9:00 a.m. to 12.00 noon in CAB 273.*

**Re-examination:** Non possible.

### **Student Responsibilities:**

**ACADEMIC INTEGRITY:** 'The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the *Code of Student Behaviour* (online at [www.ualberta.ca/secretariat/appeals.htm](http://www.ualberta.ca/secretariat/appeals.htm)) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.'

All forms of dishonesty are unacceptable at the University. Cheating, plagiarism and misrepresentation of facts are serious offenses. Anyone who engages in these practices will receive at minimum a grade of zero for the exam or paper in question and no opportunity will be given to replace the grade or redistribute the weights. Any offense will be reported to the Senior Associate Dean of Science who will determine the disciplinary action to be taken. Typical sanctions for serious violations of the Code have

included disciplinary grade reductions, disciplinary failing grades, suspension or permanent expulsion from the University of Alberta.

**EXAMS:** Your student photo I.D. is required at midterm and final exams to verify your identity. Students will not be allowed to begin an examination after it has been in progress for 30 minutes. Students must remain in the exam room for at least 30 minutes from the time the exam commenced. Electronic equipment is not to be brought to exams and hats should not be worn.

**CELL PHONES:** Cell phones are to be turned off during lectures. Cell phones are not to be brought to exams.

**STUDENTS WITH DISABILITIES:** Students who require accommodation in this course due to a disability are advised to discuss their needs with Specialized Support & Disability Services (2-800 Students' Union Building).

**ACADEMIC SUPPORT CENTRE:** Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Academic Support Centre (2-703 Students' Union Building).

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**Disclaimer:** Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar and takes precedence over the final examination date reported in this syllabus.

**Note:** Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan.

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