

# Course Summary

There follow a few transparencies which attempt to summarize the course content in terms of sections from Perkins. I hope they help you study for the exam.

I regard my scanned in notes as the definitive form of the course material. Where I have deviated from **Perkins**, I have usually used **Halzen & Martin** or **Frauenfelder & Henley** as sources. It's usually easy to spot where I took the material from.

The examination won't require lengthy mathematical derivations. The questions are just basic knowledge of the course. If you have followed the concepts in the notes, and done the assignments, you should do just fine.

Bob Orr

COURSE REVIEW:

FOCUS → SYMMETRIES  
FORCES  
CONSERVATION LAWS

DISCRETE SYMMETRIES

PARITY  
TIME REVERSAL  
CHARGE CONJ.

CONTINUOUS SYMMETRIES

ANGULAR MOMENTUM  
ISOSPIN  
WEAK ISOSPIN  
GAUGE TRANSFORMATIONS

# READING LIST FROM PERKINS ②

## CHAPTER ①

STANDARD MODEL

FERMIONS & BOSONS

PARTICLES & ANTIPARTICLES

KLEIN - GORDON

DIRAC

WEYL

} WAVE  
EQUATIONS

HELICITY

QUARK & LEPTON FLAVOR

## CHAPTER ②

ELEMENTS OF FEYMAN DIAGRAMS

PERTURBATION THEORY IDEA

WEAK INTERACTION DIAGRAMS

STRONG / COLOUR INTERACTION

ASYMPTOTIC FREEDOM

QUARK CONFINEMENT

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~~FIELD THEORY~~ FIELD THEORY CALC  
NOT ON EXAM!

FERMI GOLDEN RULE

CROSS SECTIONS / DECAYS / RESONANCES

DIFFERENTIAL X-SECTION

RADIOACTIVE DECAY FORMULA

CHAPTER 3

— USE MY NOTES

TRANSLATION / ROTATION

PARITY

SPIN / PARITY

OMIT PARITY OF PARTICLES / ANTIPART

CHARGE CONJUGATION

USE MY TREATMENT OF  
GAUGE INVARIANCE

BARYON & LEPTON CONSERVATION

C }  
P } MY NOTES  
T }

NEUTRON DIPOLE MOMENT?

↳ JUST WHAT IS IN  
MY NOTES

ISOSPIN — MY NOTES

# CHAPTER 5



Fig 5.2 UNDERSTAND

WHY QED  $\neq$  QED + WEAK

# CHAPTER 7

7.1 CLASSIFICATION

7.2 LEPTON UNIVERSALITY

FERMI THEORY EQUATIONS

7.7

7.8

NOTHING ELSE

7.5 PARITY NON CONSERVATION IN  
 $\beta^-$  DECAY

7.9 WEAK BOSON & FERMION  
COUPLING

7.11  $\nu$  BEAM

7.14 GIM & CKM MATRIX

7.15  $K^0 \bar{K}^0$

7.15.1 STRANGENESS OSCILLATIONS

7.15.2  $K^0$  REGENERATION  
7.16 CP VIOLATION

## CHAPTER 8

- 8.1 INTRO
- 8.2 DIVERGENCES
- 8.3 NEUTRAL CURRENTS
- 8.4 WEINBERG - SALAM
- 8.5 INTERMEDIATE BOSON MASSES
- 8.6 ELECTROWEAK COUPLINGS OF LEPTONS & QUARKS
- 8.7  $V$  SCATTER VIA  $Z$ -EXCHANGE  
NOT ON EXAM
- 8.9.1 TOTAL / PARTIAL  $Z$  WIDTH
- 8.12.3 GAUGE INVARIANCE & ELECTROWEAK