FORMAN CHRISTIAN COLLEGE (A Chartered University)
PHYS 422: Nuclear Physics (3 credit hours)
Course Outline
Spring 2023

Instructor Information	
Name	Dr. Fareeha Hameed
Email	fareehahameed@fccollege.edu.pk
Skype Name	hameedfareeha
Online Advising	Appointments by Email/SMS/WhatsApp For E-mail, include "PHYS 422 – Nuclear Physics" in the subject line Office hours will be announced on Moodle when campus opens. Office S-020
Online Classes	Will be held on Zoom, and recordings will be uploaded to Moodle. The time will be announced on moodle
Course Material/ Announcements	Will be uploaded on Moodle
Course Information	
Course Objectives	In this course, the fundamental principles of Nuclear Physics will be discussed. The concepts and ideas will be introduced. The mathematical equations and formulas needed will be studied. Some applications will also be taught in order to illustrate the practical applications of these principles which are sometimes abstract. This aim is to equip students with the understanding and tools to pursue further specialization, research and professions in the important applications of radiations and nuclear Physics.
Learning Outcomes:	On Successful completion of this course the student will be able to: • Acquire an understanding of fundamental principles of nuclear physics • Apply Nuclear Physics in practical fields • Describe various career options in Applied Nuclear Physics • Develop independent problem solving skills
Text Books & Reference Material	• Introductory Nuclear Physics by Kenneth S. Krane, 2008, Wiley • Nuclear Physics, John Lilley, Wiley 2002 • Brian Martin - Nuclear and particle physics-Wiley (2009) • Irving Kaplan, Nuclear Physics, Narosa Publishing House, Nineteenth Reprint, 2002 • Fundamentals In Nuclear Physics, Jean-Louis Basdevant James Rich Michel Spiro, Springer 2005 • Online lectures, videos (links will be given on Moodle)

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<td>Course Requirements & Important things to know</td>
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All examinations, tests and assignments shall be cumulative, i.e. may or may not contain material from previous assignments and tests.
<u>Technology Use:</u> The Moodle platform will be used for making announcements, sharing material, submission of assignments, and conducting quizzes, Exams, etc. Zoom will be used for online classes. Notifications will be sent on your official emails
Students are required to watch/listen to online lectures and do relevant readings. They are also required to watch online videos as instructed.
<u>Due Dates</u>:

All assignments are to be submitted by 4:00 p.m. on the due date.
Late activities will not be graded, unless previous accommodations have been made. In case of any other limitations (internet), inform prior to the deadline. Avoid submitting at the last moment. Make prior arrangements to avoid any technological problems
There are no make-up exams.

<u>Academic Honesty:</u>

All work that you submit in this course must be your own.
Unauthorized group efforts are considered academic dishonesty.
You may discuss homework (Assignments, Lab Exams) in a general way with others, but you may not consult anyone else's written work.
You are guilty of academic dishonesty if you examine another's solution, allow (actively or passively) another student to examine your solution, or you copy from the Internet without complete understanding of what you have done. University policy of plagiarism will be applicable in the case.
All cases no matter how trivial they are will be reported to Academic Integrity Committee (AIC) of FCCU. Cheating or violation of academic integrity in any exam will cause F grade.
<u>Ethics:</u> Ethics violations on exams, quizzes, assignments or any other course activities will be reported to the AIC (Academic Integrity Committee) and action will be taken according to AIP (Academic Integrity Policy) of FCC.

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<td>Assessment Criteria</td>
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<tr><td>Assignments</td><td>20%</td></tr>
<tr><td>Class participation</td><td>10%</td></tr>
<tr><td>Paper</td><td>20%</td></tr>
<tr><td>Presentation</td><td>25%</td></tr>
<tr><td>Viva Exam</td><td>25%</td></tr>
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<tr><td>Assessment</td><td>

<u>Assignments</u>:
Students will be notified about it on Moodle and will be required to submit them by the deadline. Students may be asked to give a viva for the assignment via Zoom.
<u>Paper</u>
Each student will select a topic relevant to the course. The topic will be approved by the instructor.
<u>Presentation</u>

Each student will give a presentation for about 15 minutes. After this presentation there will be detailed questions and answers session on Zoom.
The student will also submit the presentation recording for grading.

<u>Final viva exam</u>:
Students will be notified about it on Moodle and will be required to submit them by the deadline. Students may be asked to give a viva for the assignment via Zoom.

<u>Assessment Schedule will be announced in Zoom class and posted on Moodle and notification sent by email</u>
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<tr><td>Course Content</td><td>

Structure of the nucleus
Radiation and decay
Detection of radiation
Nuclear forces
Nuclear reactions
Reaction and stability of nuclear models

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<tr><td>Lesson Plan</td><td>
<table>
<tr><th>Week No.</th><th>Topics</th><th>Assessments and Activities</th></tr>
<tr><td>1st Week</td><td>Introduction</td><td>Reading and practice HW</td></tr>
<tr><td>2nd Week</td><td>Basic properties of the nucleus</td><td>Reading and practice HW</td></tr>
<tr><td>3rd Week</td><td>Alpha – Decay concepts and principles</td><td>HW Problems</td></tr>
<tr><td>4th Week</td><td>Alpha decay derivations</td><td>Reading and practice HW</td></tr>
<tr><td>5th Week</td><td>Beta – Decay concepts and principles</td><td>Paper draft submission</td></tr>
<tr><td>6th Week</td><td>Beta – Decay derivations and problems</td><td>1st assignment</td></tr>
<tr><td>7th and 8th Week</td><td>Gamma – rays</td><td>Paper submission</td></tr>
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	9th Week	Nuclear Reactions concepts and principles	HW Problems
	10th Week	Nuclear reactions derivations	2nd Assignment
	11th Week	Nuclear Forces	Reading HW
	12th Week	Nuclear Structure	Presentation
	13th Week	Detecting nuclear radiations	Practice HW
	14th Week	Problem solving	Final viva exam

Grading Scale

Grade	Quality Point	Numerical Value	Meaning
A	4.00	93-100	Superior
A-	3.70	90-92	
B+	3.30	87-89	
B	3.00	83-86	Good
B-	2.70	80-82	
C+	2.30	77-79	
C	2.00	73-76	Satisfactory
C-	1.70	70-72	
D+	1.30	67-69	
D	1.00	60-66	Pass
F	0.00	59 or below	Fail

Disclaimer

Considering the situation of the COVID-19 pandemic, the course instructor reserves the right to modify the above plan as need be during the course of the class; however, it won't be done impetuously. Any changes that would be incorporated will be informed in advance.