

Courses offered by Dhanani School of Science and Engineering

Full Course Title	Program Description
Computer Science Freshman Seminar	Computer Science is a rich field. Rooted in mathematics and logic, it is intellectually stimulating and its applications continue to enable the realization of diverse ideas that touch our lives in a multitude of ways. This seminar provides a broad overview of the theory and practice of Computer Science through a series of weekly seminars by researchers and practitioners.
Programming fundamentals	The aim of Programming Fundamentals course is to teach computer programming as a means to solve problems. It introduces the basic components of problem solving: repetition, decision making, data storage and manipulation, input/output, modularity, top-down design; expertise in the corresponding constructs – variables, data types, iteration, conditionals, functions, file and console i/o, and recursion in a high level programming language.
Introduction to Electrical and Computer Engineering	Through a series of projects, this course aims to expose the students, having little or no prior exposure, to the fascinating world of electrical and computer engineering. The course will allow the students to gain an appreciation for the history and possible futures of various disciplines within electrical and computer engineering. Students will spend most of their time in the lab working on these projects with classroom instruction for support. If time permits, the class will culminate with an open-ended final project. The topics covered in the class span across multiple future courses, including Circuits Analysis, Digital logic and design, Basic Electronics, Signals and Systems, Microcontroller Interfacing, and Computer Architecture.
Introduction to Ecology and Evolutionary Biology (Lecture and Lab)	Understanding how nature functions is necessary in order to develop environmental protection, conservation and resource management policies that work. The goal of this course is to familiarize students to ecological and evolutionary concepts that govern natural systems, so that they are able to make informed decisions on pressing social issues in Pakistan, such as global climate change, conservation of biodiversity, human population growth and resource management.
Cell Biology and Public Health (Lecture and Lab)	This course provides an introduction to cellular and molecular biology and builds its connection with human biological processes, and public health concerns; will also focus on communication surrounding complex biological concepts, and the role of design in translating that for a non-scientific audience.
Global Health and Disease	In this course, you will have the opportunity to explore health issues that cross national boundaries and disciplinary confines. Unrestrained infectious diseases may conveniently cross borders leading to international catastrophes. The growing burden of noncommunicable diseases can affect developing and developed countries alike. Non-health sector issues such as climate change or trade have dramatic worldwide effects on health status. These are just a few examples of challenges requiring international-mindedness: integration, collaboration, and coordination at a global level. In this course, you will access these issues, evaluate the strategies that are already in-place, think critically, and propose innovations to deal with and potentially solve the problems. The class sessions in this course will embrace variable teaching and learning strategies for audio and visual learners, including but not limited to flip classes, debates, think-pair-share, activities and movies/video sessions etc.

<p>Food and Nutrition (Lecture and Lab)</p>	<p>Food for thought! Thought for food! We all have heard “we are what we eat”. Let’s see if this is true, and if so, to what extent? How many of the world’s problems are due to food, and how if at all, can we use food as a solution to these problems? How can you use food to solve your problems? Let’s understand the basics of the wide range of knowledge that comes from Nutrition Sciences; let’s identify the fundamental science underlying nutritional claims; let’s critique the validity of these claims; let’s relate diet to health and disease outcomes; let’s explore if food can indeed be used as medicine. Here you will review the nutrients in foods, their functions in the human body and how you can improve your own health by choosing the foods wisely. You will examine the ways in which processed foods differ from real, whole food and the implications of food processing on health. You will learn how to read and comprehend food labels, how to debunk claims and you will start appreciating nutrition research. You will design a balanced meal plan with set calorie limits and macronutrients.</p>
<p>Learning Bioscience through Movies</p>	<p>Are you interested in movies? Bioscience? Or both? This course is for you. Join Pakistan’s pioneering course on learning bioscience through movies. This course intends to mitigate the dichotomy between science and the arts. The underlying theme of the course is to learn different aspects of biology through a popular medium of creative expression, in this case, selected films on scientific topics. The course will provide insights into myriad of biological processes governing our world. You will appreciate the power of movies in developing an understanding of various biological phenomena. You will learn about the scientific method, evolution, and survival of the fittest, ecological sustainability, genetic engineering, disease outbreaks, our body’s defense mechanisms, plant’s defense mechanisms, how plants communicate, strategies of risk assessment and risk communication, and much more. By analyzing different concepts provided in these films, you will develop critical thinking and analytical skills. The class sessions will embrace variable teaching and learning strategies for audio and visual learners.</p>
<p>Calculus I</p>	<p>This is the first course of a 2 semester Calculus sequence. The course covers functions, limits and continuity, differentiation rules, concavity and inflection points, rates, approximations, simple optimization problems to locate maxima/minima, definite and indefinite integration, applications to area, Riemann sums, and improper integrals.</p>
<p>Music of South Asia: Styles and Structures</p>	<p>The vast and complex repertoire of techniques and modes that constitute both the melodic and rhythmic universes of South Asian music render this art form as one of the greatest achievements of this region, making for an extremely robust and rich musical inheritance for the people of South Asia. This course will introduce students to the rudiments of South Asian music; its melodic and rhythmic bases and the various existing styles of performance. This course will also locate South Asian music in its historical and social contexts, and establish a foundation for pursuing more advanced studies in music.</p>

<p>Introduction to Nano-science</p>	<p>Nano-Science is a significant area of Science which deals with the understanding of the properties of materials at nanonanoscale—the world where atoms, molecules (atoms joined together), proteins, and cells rule the roost. It is the place where science and technology gain an entirely new meaning. This course offers a basic introduction to understand nanoscience and explore its applications through nanotechnology: where we can put the science into action to solve our problems. This course introduces various basic concepts in the field of Nano-Science to general audience and give them an overview of the current contribution to our lives and the potential this field holds in changing the world around us in future. This course aims at developing an understanding of the history of NanoScience with introduction to various key terminologies in the field. Further take a dive in identification of structural, electrical, magnetic and physical properties of materials with specific characterization tools. And appreciate its impact in different fields: technology, health, environment, communication, transport.</p>
<p>Inventing the Information Age</p>	<p>Our current era is often referred to as the information age, because of the widespread use of information processing capabilities which have unlocked human potential in the way unseen since the industrial revolution. This age is enabled by a number of scientific and technological inventions, some thousands of years old, others being discovered today. The effect of these inventions has been felt through profound social, economic and political change. This course surveys the key physics, mathematics and computer science inventions that enable the information age. We will study the basics of important physical constraints and phenomena that are used to build information processing devices. We will understand how coding theory allows us to reliably transmit, store and compute information on error prone physical devices. We will also discuss essential cryptographic techniques to securely transmit and store important information. The course will end with an outlook of future innovations that will further enhance humanities' information processing capabilities</p>