



Registration open until Feb. 2, 2022

KSETA Topical Courses, February 14 – 25, 2022

All courses will take place via zoom, except the FPGA course

Basic Concepts and Applications of General Relativity (broader)	Eva Hackmann (Bremen)	15.2.22	9:00 - 12:15 h	
all		17.2.22	9:00 - 12:15 h	

General Relativity is currently the best available theory of gravity, that passed every experimental test with flying colours. In this course we will focus on the basic principles and ideas of General Relativity and explain the effects that are the targets of the recent experimental breakthroughs in the field. These are, the first measurements of gravitational waves with LIGO/Virgo type detectors, and the first observation of the shadow of a black hole with the Event Horizon Telescope.

Monte Carlo simulations (broader) all	Stefan Gieseke (KIT)	14.2.22	13:30 - 16:45 h	
		18.2.22	13:30 - 16:45 h	

The course on Parton Shower Monte Carlos will cover technical details and the underlying physics of Monte Carlo Event generators for hadron colliders as they are commonly used at the LHC. The course will start with some technical introduction to Monte Carlo integration and then we go through and discuss the event generation as it goes.

Beginning with a short discussion of hard interactions we will discuss parton showers in-depth and give a short overview of hadronisation models and hadronic decays. Modern techniques to match or merge parton showers with higher order matrix elements will be discussed in detail. The tour is rounded off with a discussion of the so-called underlying event.

Statistical methods in particle physics data analysis (broader)	Andreas Meyer (DESY)	16.2.22	9:00 - 12:15 h	
all		24.2.22	9:00 - 12:15 h	

Probability distributions and their statistical properties play a fundamental role in the data analysis of particle physics experiments and elsewhere. The lecture covers current statistical methods in particle physics and their foundations, as well as some of the recent developments. In the first part of the four lectures, inference methods for parameter estimation, hypothesis testing and determination of confidence intervals are introduced. In the second part, we will address multivariate analysis, classification and machine learning methods. As time permits, unfolding techniques and systematic uncertainties will also be discussed.

Introduction to Parallel Computing on multi- and many-cores architectures (broader)	Felice Pantaleo (CERN)	22.2.22	9:00 - 16:45 h	Max. 20
all		25.2.22	9:00 - 16:45 h	Pers.

While the computing community is racing to build tools and libraries course to ease the use of heterogeneous parallel computing systems, effective and confident use of these systems will always require knowledge about the low-level programming interfaces in these systems. This course is designed to introduce through examples and hands-on exercises, based on C++, Intel TBB and NVIDIA CUDA, the abstractions that make the foundations of parallel and heterogeneous programming:

Task-based parallelism; Thread hierarchy; Synchronization; Heterogeneous Computing systems; Memory hierarchy/Shared Memory

FPGA programming (with hands on sessions?) / signal processing (broader) all	O. Sander et al. (KIT)	23.2.22	13:30 - 16:45 h	Max. 16
		24.2.22	13:30 - 16:45 h	Pers.

In this course you will learn more about the use of FPGA's in physics experiments. What is possible with FPGA, where are the limits, what are the technologies behind and what are the trends. The course will contain practical examples, e. g. with Redpitaya or similar.

Managing physical and mental health in a high-stress environment (better)	Maurice Maurer (Training Scientists)	14.2.22	9:00 - 12:15 h	Max. 12
all		18.2.22	9:00 - 12:15 h	Pers.
		21.2.22	9:00 - 12:15 h	
		23.2.22	9:00 - 12:15 h	

This course targets scientists who want to improve their physical and mental wellbeing despite the stressors of the scientific world. It also aims at closing the health gap between the corporate and scientific sectors by providing the necessary tools to take care of both physical and mental health during times of high pressure, high workload, low income, and high levels of uncertainty.

Definition of "healthy" lifestyle; Movement, exercise, and fascia health; Nutrition; Recovery and sleep; Mental health and mental performance

www.training-scientists.de