

GOVERNMENT COLLEGE KASARAGOD

VIDYANAGAR, KASARAGOD, KERALA, 671123www.gck.ac.in



NAAC 3RD CYCLE ACCREDITATION

ADD ON COURSE IN COMPUTATIONAL PHYSICS AND PYTHON



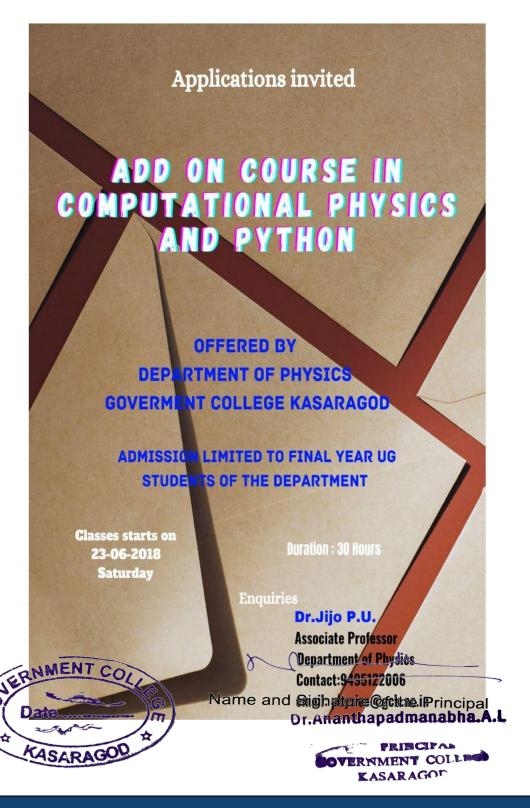
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SYLLABUS

Course Description:

This intensive 30-hour course is designed to introduce physics graduate students to Python programming. Python is a versatile and widely-used programming language in scientific research, and it provides a powerful toolset for data analysis, simulation, and automation. Through a combination of lectures, hands-on coding exercises, and practical applications in physics, this course aims to equip students with the programming skills necessary to enhance their research capabilities.

Prerequisites:

Basic understanding of physics concepts relevant to your research area.

No prior programming experience is required.

Course Objectives:

By the end of this course, students will be able to:

Understand the fundamentals of Python programming, including syntax, data types, and control structures.

Write Python programs to perform data manipulation, analysis, and visualization.

Utilize Python libraries commonly used in physics research, such as NumPy, SciPy, and Matplotlib.

Apply Python for solving physics problems, including simulations and numerical analysis.

Develop skills for data input and output, including reading and writing files.

Course Outline:

Week 1: Introduction to Python (3 hours)

Introduction to programming and Python

Setting up a Python development environment (e.g., Anaconda)

Python syntax, variables, and data types

Week 2: Data Manipulation and Analysis (6 hours)

Data arrays and basic operations with NumPy

Pandas for data manipulation

Data visualization with Matplotlib

Week 3: Scientific Computing (6 hours)

Introduction to SciPy for scientific computing

Solving equations and optimization

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Week 4: Physics Simulations (6 hours)

Introduction to numerical simulations in physics

Solving differential equations using Python (e.g., ODEs and PDEs)

Monte Carlo simulations

Week 5: File Handling and Data I/O (3 hours)

Reading and writing data to files (e.g., CSV, JSON)

Data preprocessing and cleaning

Week 6: Final Projects and Review (6 hours)

Students will work on individual or group projects related to their physics research.

Regular project updates and peer feedback.

Review of key concepts and skills.

Assessment and Grading:

Class participation: 10%

Homework assignments: 30%

Midterm project: 20% Final project: 30% Final presentation: 10%

Textbook (recommended):

"Python for Scientists" by John M. Stewart

This condensed syllabus focuses on core Python programming skills and their application in physics research within a 30-hour timeframe. The schedule is intensive, so students should be prepared to dedicate significant time outside of class for practice and projects.

SUMMARY REPORT

The course titled **COMPUTATIONAL PHYSICS AND PYTHON** introduced for final year UG students. Numerous students within the college expressed interest in learning Python programming. Additionally, 35 students, keen on programming, enrolled in the course. The course commenced on June 11, 2018, in an offline format. Theoretical sessions and practical exercises were facilitated. The course concluded successfully on September 08, 2018. This helped the students understand complex physical phenomenon using computational physics which is an invaluable tool in modern scientific research.

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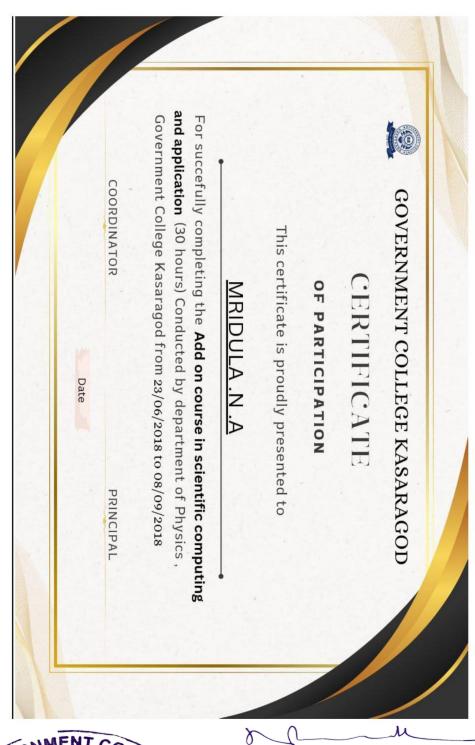


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