कार्यालय प्रधान महालेखाकार (ले व ह)-II,
महाराष्ट्र
सिविल लाईन्स, नागपुर - ४४०००१
OFFICE OF
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लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

आज़ादी का अमृत महोत्सव

नि.वि.- I/ई-I/Information System

दिनांक: 23/01/2025

परिपत्रक

मुख्यालय से प्राप्त ई-मेल दिनांक 05/12/2024 तथा परिपत्रक दिनांक 18/12/2024 में सूचित किये निर्देशानुसार कार्यालयीन अधिकारीयों/कर्मचारियों को दिए गए लिंक पर जाकर संलग्न पाठ्यक्रम की सूची में से कम से कम एक पाठ्यक्रम में नामांकन करना अनिवार्य है |

अतः सभी वरिष्ठ विभागीय लेखा अधिकारी/विभागीय लेखा अधिकारी एवं विभागीय लेखपालों को सूचित किया जाता है कि दिए गए लिंक https://swayam.gov.in or https://igotkarmayogi.gov.in/#/ पर जाकर पाठ्यक्रम में नामांकन कर WM-I अनुभाग के ई-मेल wm-1.mh2.ae@cag.gov.in पर दिनांक 24/01/2025 तक सूचित करें |

(प्राधिकार: वरिष्ठ उप महालेखाकार (निर्माण लेखा) के दिनांक 23/01/2025 के आदेशानुसार)

हस्ता

वरिष्ठ लेखा अधिकारी/नि.वि.1

नि.वि.- I/ई-I/Information System TR-358

दिनांक: 23/01/2025

प्रति,

1. वरिष्ठ उप महालेखाकार (निर्माण लेखा) के निजी सहायक
2. वरिष्ठ लेखा अधिकारी (EIS) को वेब -साइट पर अपलोड करने हेतु
3. सभी वरिष्ठ विभागीय लेखा अधिकारी/विभागीय लेखा अधिकारी एवं विभागीय लेखपालों को परिचालित |

वरिष्ठ लेखा अधिकारी/नि.वि.1

Office of the Comptroller and Auditor General of India, New Delhi
Statistical Wing

No. 475 - CAG/SA/Misc. Stat Matters/11-2024
18 Dec. 2024

Subject: Request for enrolment in useful short term Statistical Courses conducted by IITs available on SAWAYAM Portal

Dear All

It is a fact that Sampling and Statistics are part of every Audit conducted by the Department. Though a number of Short-Term Trainings are organised within the Department for the Officers and Staff, it appears that we should look for the trainings from other institutes of repute. Accordingly, the following 6 short term courses, with **Statistical Perspective** conducted by the various IITs presently available on the **SAWAYAM Portal** have been identified; these courses do not require Statistical Background as such and may be highly useful for all the Officers/Staff of the Department:

1. Essentials of Data Science with R Software-1: Probability and Statistical Inference
2. Essentials of Data Science with R Software-2: Sampling Theory and Linear Regression Analysis
3. Introduction to Probability Theory and Statistics
4. Introduction to Statistics
5. Probability -I with Examples Using R
6. Business Statistics.

A detailed list of topics covered in these courses is enclosed as Annexure A. These courses are available free of cost and certificate is awarded on passing the relevant exam after completing the courses; for other details one may visit the **SAWAYAM Portal**.

It is advised that all the Officers/Staff, including IAAS officers may enrol in at least one of these or similar courses. HODs are requested to encourage the Officers/Staff to enrol for these courses. There is hardly any need to mention that these Statistics and Sampling courses would be highly useful for the staff and officers for conducting the various Audits as also in performing related activities. Moreover, the participation will boost personal and professional growth of individuals.

It is once again requested that all the Officers/Staff of the Department may take advantage of the courses offered through the SWAYAM Portal (**an initiative of IIT Madras**) by enrolling themselves for one or more of these courses and by completing them.

PTO

Annexure 'A'

Course layout of relevant courses:

1. Essentials of Data Science With R Software-1: Probability and Statistical Inference:

Week 1: Introduction to data science, basic calculations with R Software and probability theory

Week 2: Probability theory and random variables

Week 3: Random variables and Discrete probability distributions

Week 4: Continuous probability distributions

Week 5: Sampling distributions and Functions of random variables

Week 6: Convergence of random variables. Central limit theorems and Law of large numbers

Week 7: Statistical inference and point estimation

Week 8: Methods of point estimation of parameters

Week 9: Point and confidence interval estimation

Week 10: Confidence interval estimation and test of hypothesis

Week 11: Test of hypothesis

Week 12: Test of hypothesis for attributes and other tests

2. Essentials of Data Science With R Software-2: Sampling Theory and Linear Regression Analysis

Week 1: Introduction to data science and Calculations with R Software

Week 2: Basic Fundamentals of Sampling

Week 3: Simple Random Sampling

Week 4: Simple Random Sampling with R

Week 5: Stratified Random Sampling

Week 6: Stratified Random Sampling with R

Week 7: Bootstrap Methodology with R

Week 8: Introduction to Linear Models and Regression and Simple linear regression Analysis

Week 9: Simple Linear Regression Analysis with R

Week 10: Multiple Linear Regression Analysis

Week 11: Multiple Linear Regression Analysis with R

Week 12: Variable Selection using LASSO Regression

3. Introduction to Probability Theory and Statistics

Week 1: Basics of Probability

Week 2: Random Variable

Week 3: Moments and Inequalities

Week 4: Standard Distributions

Week 5: Higher Dimensional Distributions

Week 6: Functions of Several Random Variables

Week 7: Cross Moments

Week 8: Limiting Distributions

Week 9: Descriptive Statistics and Sampling Distributions

Week 10: Point and Interval Estimations

Week 11: Testing of Hypothesis

Week 12: Analysis of Correlation and Regression

4. Introduction to Statistics

Week 1: Collecting data

Week 2: Summarizing data

Week 3: Visualizing data

Week 4: Analysis tool – Sampling Distribution (one sample problem)

Week 5: Analysis tool – Sampling Distribution (two sample problem)

Week 6: Analyzing Data – Point Estimation

Week 7: Analyzing Data – Point Estimation for missing data

Week 8: Analyzing Data – Testing of Hypothesis

Week 9: Analyzing Data – Testing of Hypothesis (continued)

Week 10: Analyzing Data – Bootstrap Hypothesis Testing

Week 11: Analyzing Data – Confidence Interval Estimation

Week 12: Analyzing Data – Bootstrap Confidence Interval.

6. Business Statistics

Week 1: Introduction, data collection and presenting data in tables

Week 2: Numerical descriptive measures and basic probability

Week 3: Discrete and continuous probability distributions

Week 4: Sampling and sampling distributions

Week 5: Confidence interval estimation

Week 6: One sample tests and hypothesis testing

Week 7: Two sample tests means

Week 8: Two sample tests proportions and variance

Week 9: ANOVA

Week 10: Chi-Square tests

Week 11: Simple linear regression

Week 12: Multiple regression basics

Brief overview on Courses on iGot and Swayam portals

Continuous Professional Education in Information Systems: Enhancing Skills in AI, ML, Statistics, and Mathematics

In our mission to adapt to the evolving digital landscape, it has become imperative to continually upgrade our skills and knowledge in the IT sector. With the transition of most IA&AD functions to online platforms, it is crucial for all officers and staff to gain a deeper understanding of Information Systems, particularly in areas like Artificial Intelligence (AI), Machine Learning (ML), and Data Analytics.

To equip our team with the foundational skills necessary for these advancements, a curated list of free, high-quality online courses is provided. These courses are offered by the SWAYAM Portal, an initiative by IIT Madras, and are specifically tailored to introduce key concepts in AI, ML, and related fields.

Importance of Statistics and Mathematics for AI and ML in Audit Work

The effective implementation of AI and ML in auditing requires a solid foundation in statistics and mathematics. These disciplines form the backbone of data analysis, predictive modelling, and algorithm design. By mastering these basics, auditors can:

- **Understand Data Patterns:** Identify trends and anomalies that may indicate areas of concern.
- **Develop AI Applications:** Utilize statistical and mathematical techniques to build simple AI/ML models for audit processes.
- **Prepare for Advanced Learning:** Create a pathway to learn advanced statistics and programming languages like R or Python for deploying sophisticated models in the

Recognizing this, the following courses have been identified on the **SWAYAM Portal**, an initiative by IIT Madras, for all officers and staff to undertake as part of our Continuous Professional Education program. These courses are free of cost, of high quality, and offer certification upon completion.

Recommended Courses

Foundational Courses

1. **Fundamentals of Artificial Intelligence**
   By Prof. Shyamanta M. Hazarika | IIT Guwahati
   Course Link
   A beginner-friendly introduction to AI concepts and applications.
2. **A Basic Course in Machine Learning for All**
   By Sumitra Padmanabhan
   Course Link
   Learn the fundamental principles of Machine Learning and its practical uses.
3. **Essential Mathematics for Machine Learning**
   By Prof. S. K. Gupta, Prof. Sanjeev Kumar | IIT Roorkee
   Course Link

SRAO | EIS.

Focus on mathematical concepts critical for AI and ML, such as linear algebra and calculus.

4. **Descriptive Statistics with R Software**
   By Prof. Prashant Jha, Prof. Shalabh
   Course Link
   Understand statistical methods using R, a versatile tool for data analysis.

Any other course related to introduction/Use of AI , ML and data analytics may also be chosen.

Advanced Learning Opportunities

Staff interested in delving deeper may later explore advanced courses in statistics and programming, such as:

1. **Inferential Statistics and Predictive Analytics**
2. **Advanced Machine Learning with Python or R**

Why These Courses important

- **Enhanced Auditing Capabilities**: Learn how AI and ML can automate data analysis and identify anomalies effectively.
- **Data-Driven Insights**: Use statistical techniques to interpret audit data and support decision-making.
- **Future Readiness**: Equip yourself to audit systems that increasingly rely on AI, ensuring compliance with ethical and regulatory standards.

All officers and staff, including IAAS officers, are advised to enrol in at least one course from the above list as well any similar courses on iGOT platform within a week of receiving this email. Enrolment and completion of courses should be maintained at office level and the same will be taken by CTO wing for database creation for future use.

How to Enrol

a. **SWAYAM portal**
   1. Visit the SWAYAM Portal: https://swayam.gov.in.
   2. Search for the recommended courses.
   3. Register and start learning.

b. **iGOT**
   1. Visit iGOT Karmayogi portal: https://igotkarmayogi.gov.in/#/
   2. Click "Sign Up" or "Register" on the homepage.
   3. Fill in your details (name, email, phone, and relevant ID).
   4. Verify your account via the confirmation link sent to your email/SMS.
   5. Log in and explore available courses