

Course Syllabus

ISAT 640: Information and Technology Management

Spring 2012 – 3 credits – Section EX01

Instructors

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Description

This study-unit focuses on two aspects of data management: (I) Data Measurement & Instrumentation and (II) Data Mining.

In the first component, students will explore various aspects of measurement and instrumentation, including (i) measurement units, (ii) measuring systems components, (iii) uncertainty in measurement, (iv) calibration, (v) traceability, and (vi) accreditation & certification processes. During hands-on lab sessions, students will explore the use of DMMs, light sensor and voltage divider to demonstrate the accuracy of instruments & the precision of measurement. Students will also review examples of data acquisition system building blocks, such as sensors, variable conversion elements, signal conditioning (including digitization), signal processing, signal transmission and signal presentation. A second hands-on lab session will focus on signal conditioning (amplification) and measurement uncertainties calculations.

In the second component, students will explore the acquisition, representation, storage, retrieval, and distribution of data, information and knowledge from both a historical and contemporary perspective. The unit places special emphasis on IKM technology in science and technology and on the information economy, the management of data, information, and knowledge as critical enterprise assets. Students will study computer systems as tools for information and knowledge management and examine ethical, legal, and social issues in the management of data, information, and knowledge, including intellectual property, privacy, and security.

Goals

- Acquire a basic understanding of Data Measurement basics & definitions.
- Gain a high level understanding of Data Acquisition Systems.
- Gain an appreciation of the implications of measuring system calibration.
- Acquire an overview of the Accreditation and Certification processes.
- Acquire an in-depth knowledge of transducers and sensors.
- Gain a clear and concise knowledge of Data Measurement analysis fundamentals (including data processing, presentation, etc.).
- Acquire a basic understanding of the fundamentals of signal & data transmission (including remote sensing, wireless sensor networks, etc.).
- Gain a strong insight into specific data acquisition & control applications.
- Gain basic hands-on working knowledge of DMM, voltage divider and op-amp.

Learning Objectives

1. Knowledge & Understanding:

By the end of the study-unit the student will be able to:

- Define basic concepts relating to data measurement and Data Acquisition Systems
- Describe accreditation and certification processes
- Explain fundamentals of signal & data transmission
- Describe what data mining is
- Explain the steps involved in data mining
- Describe the technological components necessary to do data mining, i.e. hardware and software
- Describe how to measure system calibration.

2. Skills:

By the end of the study-unit the student will be able to:

- Identify transducers and sensors
- Identify the main building blocks of measuring systems
- Apply hands-on working knowledge of DMM, voltage divider and op-amp
- Calculate Type A & uncertainties of measurements
- Identify scenarios in which data mining is likely to be a useful problem solving tool
- Demonstrate the ability to use at least one tool (or set of tools) to complete a data mining analysis.

Main Texts and Supplementary Readings

- Hughes, I. and Hase, T. (2010). Measurements and their Uncertainties: A practical guide to modern error analysis. Oxford University Press, USA
- Dunn, P. (2011). Fundamentals of Sensors For Engineering and Science. CRC Press
- Han, J., Kamber, M. and Pei, J. (2005). Data Mining: Concepts and Techniques, 2nd Ed. Morgan Kaufmann

Course Format

Course will be taught through lectures, practical, and fieldwork

Grading

Presentation	30%
Examination	70%

JMU Policies

Information is provided at www.jmu.edu/syllabus that lists the common JMU academic policies.