Engr 116/13333   Virtual Instrument Engineering   Syllabus Spring 2020

Instructors

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Lecture

Monday / Wednesday / Friday 10:50 - 11:40

Room: 332 Votey

Required Text

Hands-On Introduction to LabView for Scientists and Engineers by John Essick

Oxford University Press

Isbn 978-0-19-085306-8 paperback

Isbn 978-0-19-085308-2 ebook

Help Session Hours

Email above addresses for appointment

Grading (one credit version)

quizzes	10%
lab assignments & homework	50%
midterm examination	40%

Grading (two credit version)

quizzes	10%
lab assignments & homework	50%
midterm examination	20%
final examination	20%

Grading (three credit version)

quizzes	05%
lab assignments & homework	50%
midterm examination	15%
final examination	15%
term project	15%

Notes on Grading

All assignments and quizzes are on a 10 point basis.

Midterm & Final Examinations are on a 100 point basis

Syllabus Units Overview

The LabView Programming Environment

> **Project Explorer**

> **Virtual Instrument (hereafter referred to as VI)**

> **VI Basics: Front Panel & Block Diagram Editing**

> **Controls & Functions**

> **VI Debugging & Error Handling,**

Data Flow Programming

> **Simple Data Types**

> **Cyclical Loops: While Loops, For Loops**

> **Graphs & Charts**

Waveform Parameters / Simulators / the Waveform data type

> **VI Timing & TimeStamps**

> **Cyclical Loops with regard to Sine Waves / ch2 & ch3**

> **Indexing, Clusters, Type Definitions ch4**

Script Programming via MathScript & Formula Nodes ch4

Data Storage: Output of Character Strings into Data Files ch6

> **Arrays & Bundles**

> **Array Functions, Data Feedback , Generating Plots ch6**

> **Ch13**

Advanced LabView Programming: Shift Registers ch7

> **Noise & Signal Averaging**

Advanced LabView Programming: State Machines Ch8

> **Case Structures, Event-Driven Programming, Modularity, Connector Panes**

> **Property Nodes & Control References**

Advanced LabView Programming: Sequence Structures & Data Dependency Ch9

Midterm Testing (ends one-credit enrollment)

DAQ: Intro: basic input & output parameters / range, resolution & errors Ch5

  DAQ: Intro input modes / sampling parameters / aliasing Ch5

  DAQ: Measurement and Automation Explorer (MAX)

  Waveform Generation via Hardware & Software

File IO with Binary & Text Formats

File IO Techniques, TDMS files, Code Inheritance and Refactoring

DAQ: Acquiring Measurements from Hardware

DAQ Programming Variables, Queues, Notifiers, Conditions & Data Communication

Control of Stand Alone Instruments Ch13

  Communication Properties

    Interface Bus / Instrument Driver / Signals

  Transducers / Actuators / Sensors

  VISA setup and query using Virtual Instrument Software Architecture

   MAX-Advanced use of Measurement and Automation Explorer

Advanced External Control

  Robotics & Mechatronics

 Final Testing

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Week One: Essick Chapter One

  Lecture   LabView1.pdf

  Reading   http://www.ni.com/getting-started/labview-basics/environment

  Lab Activity: Essick Parity Checker & Palindrone Checker