

EE 370 Final Exam Topics

Ethics

- Ethics vs. Morals
- Why Study Ethics?
- Code of Ethics: Fundamental Canons – summary
- Kohlberg's Moral vs. Professional Development

Biosensors and Bioinstrumentation

- Measurement Basics
- Measuring in Medicine: Objectives
- Measuring in Medicine: Unique Aspects
- Biosensor Requirements
- Sensor Classification
- Electric and Magnetic Transducers
- Mechanoelectric Transducers
- Piezoelectric Effect
- Photoelectric Effect
- Hall Effect
- Thermoresistive Effect
- Thermoelectric Effect
- Bioelectric and Biomagnetic Signals
- Biomechanical Signals
- Biomechanical Signals: Flow Velocity
- Artifacts
- Artifacts: Examples
- Sensor Sensitivity
- Sensor Accuracy and Precision
- Sensor Resolution
- Sensor Linearity and Offset

Signal Processing

- Signal Classification: Predictability
- Signal Classification: Periodicity
- Signal Classification: Support
- Signal Classification: Time and Amplitude
- Computer Interfacing of Biomedical Signals
- Typical Signal Processing Chain
- Analog to Digital Conversion (ADC)
- Digital to Analog Converter (DAC)
- Signal Isolation

Safety

- Physiologic Effects of Electricity
- Macroshock and Microshock
- Skin and Body Resistance
- Importance of Earth Connection
- Mechanical Safety
- Goals of Hygiene Measures
- Causes of Infection
- Chemical Disinfection
- Comparison of Chemical and Physical Disinfection Processes
- Targeted Measures to Prevent Transmission of Germs and Infections

Medical Imaging

- Ultrasound Imaging Basic Idea
- Ultrasound Image Formation
- B-Mode (Brightness)
- M-Mode (Motion)
- Color Doppler Mode (Color Flow Mapping)
- 3D and 4D Imaging Modes
- Reflection of Ultrasound Waves
- Ultrasound Safety
- Magnetic Resonance Imaging Basic Idea
- Nuclear Magnetic Resonance
- Communication with Nuclei: Proton
- MRI Effects on Environment
- Environment Effects on MRI
- X-Ray Generation
- X-Ray Attenuation inside Body
- X-Ray Imaging Basics
- Plain X-Ray Imaging System
- Difference Between Analog and Digital Systems
- Film vs. Digital Images
- Computed Tomography (CT)
- Display of CT Images
- Bioeffects of X-Rays
- X-Ray Exposure Dose (Micro Sievert)
- Precautions for X-Ray Exposure