

*BIOMEDEA III*

*Stuttgart, September 23 - 25, 2005*



# Clinical Engineering Certification

Frank R. Painter, CCE

Chairman, Healthcare Technology  
Certification Commission



# History

- **1973-1999** Association for the Advancement of Medical Instrumentation (AAMI-trade organization)
  - 100 grandfathered in 1975
  - 294 certified by examination
  - program suspended for “lack of interest”
- **2000-2005** American College of Clinical Engineering (ACCE – professional organization)
  - Examinations started November 2003
  - 116 previously certified individuals – applied and received for recognition
  - 60 applied for exam
  - 30 took the exam during three sittings - 24 certified



# Organization

ACCE – Healthcare Technology Foundation

Healthcare Technology  
Certification Commission

Board of Examiners for  
Clinical Engineering Certification



# Responsibilities

- ACCE Foundation
  - oversees funding
- HT Certification Commission
  - administrates program
  - communicates with applicants and CCEs
- Board of Examiners
  - Writes exam questions
  - Conducts oral exams
  - Reviews renewal applications



# Exam Process

- Structured to match “Clinical Engineering Body of Knowledge”
- Written exam (administered by testing agency)
- Oral exam (administered by Board of Examiners)
- Certification valid for three years
- Renewal required



# Eligibility Requirements

*One of these is required:*

- PE License & 3 yrs CE practice
- BS Eng & 4 yrs eng practice with 3 yrs CE
- BS in SCI or Math & 6 yrs Eng w/ 3 yrs CE
- BSET & 8 yrs eng practice w/ 3 yrs CE
- None of above & 10 yrs eng practice w/ 3 yrs CE



# Program Goals

- To become fully accepted by the Clinical Engineering community
- To remain financially self-sufficient
- To change the exam content as the body of knowledge changes
- To require evidence of continuing practice to retain certification



# Other Considerations

- ACCE promotes CE Certification
- AHT Foundation manages the process
- These organizations are separate to avoid self-promotion.
- Certification program will seek national accreditation



# Conclusion

- ACCE saw the need and moved to establish a valid process
- Certification program is evidence of a maturing and established profession
- Establishes de facto “Standard of Practice” for clinical engineering
- Valid and defensible peer review process



# Clinical Engineering Certification

# Thank You!

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# Clinical Engineering Education

at the

University of Connecticut

Frank R. Painter  
Clinical Engineering Program Director  
University of Connecticut



# M.S. Bio-Medical Engineering

- **Academic** - Coursework
  - Biomedical Engineering
  - Clinical Engineering
- **Experience** - Internship
  - CE in a University Teaching Hospital
  - Requires two years @ 20 hrs/week
- **Application** - Thesis
  - 12 months of work, present & publish



# Biomedical Engineering Courses

- Physiological Systems
- Human Biomechanics
- Biomaterials & Tissue Engineering
- Clinical Instrumentation
- Physiological Modeling
- Drug Design
- Assistive Technologies Design
- Advanced Ultrasound Imaging Techniques
- Biosensors
- Communication & Control in Physiological Systems



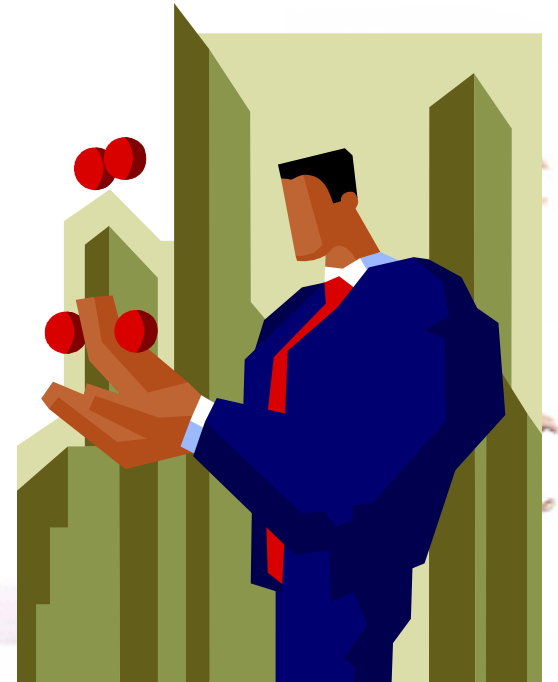
# Clinical Engineering Courses

- Clinical Engineering Fundamentals
- Human Error and Medical Device Accidents
- Engineering Problems in the Hospital
- Medical Instrumentation



# Clinical Engineering Fundamentals

- Technology Management
- Equipment Management
- Information Management
- Maintenance Management
- Quality Management
- Safety Management
- Risk Management
- Financial Management
- Project Management
- Ethics
- Administration



# Human Error and Medical Device Accidents

- Human Error
- Human Factors Engineering
- FDA & Medical Devices
- Root Cause Analysis
- HFMEA
- Patient Safety
- Investigation Techniques
- Medical Device Accidents & the Legal System



# Engineering Problems in the Hospital

- Networks, Networking, PACS, Telemedicine
- Power Quality & Power Distribution
- EMI / EMC / Frequency Management
- Ventilation Systems
- Lighting Systems
- Communication Systems
- Medical Gas Systems
- Radiation Protection
- Infection Control
- Healthcare Architectural Design
- Fire Control Systems



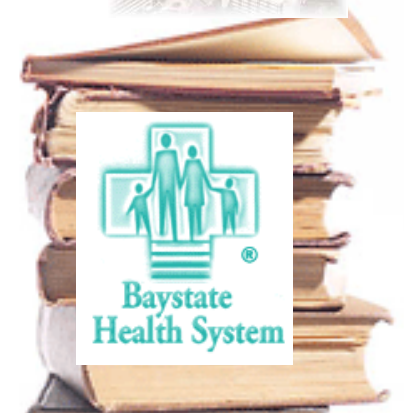
# Medical Instrumentation

- Anesthesia Monitoring & Gas Delivery Systems
- Laboratory Technologies
- Digital Imaging Systems
- CT Technology
- MR Technology
- Radiation Therapy
- Lasers
- Cardiac Assist Devices



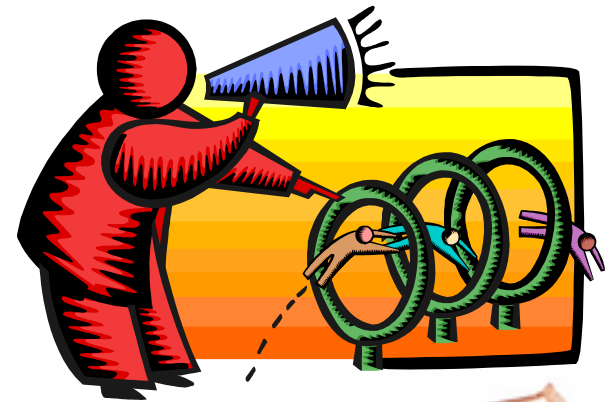
# Clinical Engineering Internship Program Participants

- Hartford Hospital
- UCONN Health Center
- Baystate Health Systems – Springfield, MA
- Connecticut VA Med Ctr
- UMASS Medical Center – Worcester
- Rhode Island Hospital
- St. Francis Hospital
- Yale New Haven Hospital



# Clinical Engineering Responsibilities

- Safety Committee
- Product Evaluation
- Staff Education
- Technology Assessment
- Quality Improvement
- Technology Planning / Installation
- CMMS Management
- Software Development
- Incident Investigation



# Thesis Projects

- CE Benchmarking
- Image Processing
- Equipment Maintenance Strategies
- Equipment Replacement Planning
- Biomaterials
- CE Process Modeling
- Machine Vision in Healthcare
- Alarm Recognition Systems



[www.bme.uconn.edu](http://www.bme.uconn.edu)

Thank You !



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