Educational Programs in
Business Analytics
at the

Lindner College of Business

Craig M. Froehle, Ph.D.
Associate Professor
UC and Cincinnati Children's Hospital

Department of
Operations, Business Analytics and Information Systems (OBAIS)

- Founded in 1968 as "Quantitative Analysis"
- First PhD student graduated in 1972
- MS in Business Analytics began in late 1970s
- Undergrad major in Quantitative Analysis 1978-1999
- Currently 14 tenure-track faculty

Current Analytics Programs

MS in Business Analytics

- Combines operations research, optimization, probability modeling, applied statistics, and simulation methods
- Admit ~45 students per year to 9-to-12-month program
- 100% job placement for past 15+ years
- Flexible electives (see list next page)
- Concludes with either a thesis or a project
- Program Coordinator: Dr. David Kelton <david.kelton@uc.edu>

Business Analytics Courses

22QA722
Regression Analysis
least squares, formal methods of inference, model diagnostics based on analysis of residuals, use of dummy variables, variable selection and model building, Introduction to logistic models. Prereq: 22QA721. Credit Level: G. Credit Hrs: 4.00

22QA723
Sample Survey
Statistical aspects of sample survey. Survey designs; simple random, stratified, cluster, multi-stage, and probability proportional to size sampling. Estimation methods for means, totals, ratios, and proportions. Planning and implementing surveys. Prereq: 22QA721. Credit Level: G. Credit Hrs: 4.00

22QA724
Multivariate Methods
Multivariate normal distribution, its parameters and model diagnostics. Statistical analyses involving multivariate means, covariance and correlation matrices; Special multivariate techniques; principle components, canonicl, discriminant, and factor analyses. Prereq: 22QA722, 22QA731. Credit Level: G. Credit Hrs: 4.00

22QA725
Forecasting and Time Series Analysis
Univariate Box-Jenkins time series modeling for stationary and nonstationary processes. Fore- casting seasonal and nonseasonal time series. Special forecasting techniques such as transfer function modeling, and intervention analysis. Prereq: 22QA721. Credit Level: G. Credit Hrs: 4.00

22QA726
Design of Experiments
Basic concepts of experimental design. Linear statistical models;

22QA750
Optimization Modeling
probabilistic mathematical optimization models. Required projects in modeling and solving applications. Prereq: 22QA712. Credit Level: G. Credit Hrs: 4.00

22QA751
Optimization Analysis
Solution techniques and analyses for linear, non- linear, network and integer optimization models including: optimization criteria, simplex routines, duality, sensitivity; Lagrangian duality, gradient, and penalty methods for con- strained and unconstrained nonlinear models; and branch-and-bound and cutting plane methods for integer models. Prereq: 22QA750. Credit Level: G. Credit Hrs: 4.00

22QA752
Advanced Topics in Optimization
Solution techniques and analyses for linear, non- linear, network and integer optimization models including: optimization criteria, simplex routines, duality, sensitivity; Lagrangian duality, gradient, and penalty methods for con- strained and unconstrained nonlinear models; and branch-and-bound and cutting plane methods for integer models. Prereq: 22QA751. Credit Level: G. Credit Hrs: 4.00

22QA760
Stochastic Modeling
Formulation and analysis of discrete and continuous Markov chains, Poisson process, and birth-death processes. Application in queuing, inventory, and reliability. Required project in modeling and solving applications. Prereq: 15MATH264, 22QA731. Credit Level: G. Credit Hrs: 4.00

22QA761
Advanced Topics in Stochastic Modeling

Current Analytics Programs

MS in Business Analytics

Some recent MS projects & theses:

- A Mixed-Integer Programming Approach to a Profitable Airline Route Network Design

- A Study on Bond Yield Curve Forecasting

- Bottleneck Analysis via Simulation of a Steel Barrel Manufacturing Mill

- An Analysis of Running Records Using Frontier Analysis

- Nurse Schedule Optimization at a Children's Hospital ED: A Linear-Programming Approach

- Forecasting Loan Loss Rates Using Multivariate Time-Series Models

- A Data-Mining Approach to Understanding Cincinnati Zoo Customer Behavior

- A Maximal-Set-Covering Model to Determine Allocation of Police Vehicles in Response to 911 Calls

- Bayesian Decisive Prediction Approach to Optimal Mailing Size Using BLINEX Loss

- Nurse Scheduling Using a Column-Generation Heuristic

More at http://business.uc.edu/programs/graduate/msbana/academics/past-research-projects.html

Current Analytics Programs

PhD in Business Analytics (or Operations)

- MS in Business Analytics PLUS advanced methodology seminars and research training to pursue an academic career
- 4 of our current 15 doctoral students are BA; 8 are Operations
- Traditional 4-year program:
  - 2 years of coursework
  - Comprehensive exam
  - Dissertation proposal defense
  - Dissertation defense
- Recent PhD placements: Michigan State, Clemson, Oregon State, Tennessee, and Cincinnati Children's Hospital
- Program Coordinator: Dr. Craig Froehle <craig.froehle@uc.edu>

Current Analytics Programs

PhD in Business Analytics (or Operations)

Some recent healthcare-related doctoral dissertations:

2012

- *Partial Flexibility Utilization in Healthcare* – Yann Ferrand

2011

- *Technology Enabled New Inventory Control Policies in Hospitals* – Claudia Rosales
- *Resource Allocation under Uncertainty to Improve Service Operations* – Muer Yang

2010

- *Operational Planning & Scheduling in Outpatient Clinic Environments* – Denise White

Current Analytics Programs

PhD in Business Analytics (or Operations)

Current OBAIS PhD students focusing on healthcare problems:

Mike Ward, *MD, MS, MBA*

- Emergency operations, EHR data integrity, patient flow, discrete-event simulation
- Awarded the 2011 Emergency Medicine Foundation fellowship

Elham Torabi, *MS*

- Nurse scheduling, outpatient scheduling, stochastic optimization & simulation

Lauren Laker, *MBA*

- Healthcare technology and staff coordination, statistics & structural equation modeling

NEW!

Doctoral Assistantship in Emergency Operations

- Joint assistantship between OBAIS and UC Emergency Medicine
- Student spends 20 hours/week for a 12-month academic year
- Learns emergency medicine environment, processes & culture
- Proposes, initiates, executes, & publishes new applied research
- Novel, cross-disciplinary opportunity
- EM Program Coordinator: Dr. Michael Ward <wardmj@ucmail.uc.edu>

Some Recent OBAIS Faculty Healthcare Projects

Project	Sponsor/Collaborator	Faculty Lead(s)
Outpatient Clinic Flow & Scheduling		
- Orthopedics	Cincinnati Children's	Craig Froehle + Mike Magazine
- Pediatric Primary Care	Nationwide Children's (OH)	Mike Magazine
- Neurosurgical	Mayfield Clinic & Spine (OH)	Mike Magazine
- Internal Medicine/GI	University Hospital (OH)	Craig Froehle
- Pulmonary	Cincinnati Children's	Craig Froehle
- Optimal use of Mid-Level Providers	University Hospital (OH)	Craig Froehle
ED Flow, Staffing & Scheduling		
- Pediatric ED Flow	Cincinnati Children's	Craig Froehle
- Pediatric ED Flow	Cincinnati Children's - Liberty	Mike Magazine
- Adult ED	University Hospital (OH)	Craig Froehle
Radiology		
- ED/Radiology Handoff Workflow	University Hospital (OH)	Craig Froehle
- Radiology Workflow/*RadStream*	Cincinnati Children's	Craig Froehle
- Knowledge-Worker Interruptions	Cincinnati Children's	Craig Froehle
Surgical Services		
- OR Flexibility Models	Cincinnati Children's	Mike Magazine + Uday Rao
- Surgical Scheduling	Cincinnati Children's - Liberty	Mike Magazine + Uday Rao
- Multi-site Block Scheduling	Cincinnati Children's	Craig Froehle
CICU Boarding Models	Mount Sinai Hospital (NY)	Mike Fry
Hospital Inventory Models & Policies	Cincinnati Children's	Mike Magazine

Some Business Analytics Textbooks by OBAIS Faculty
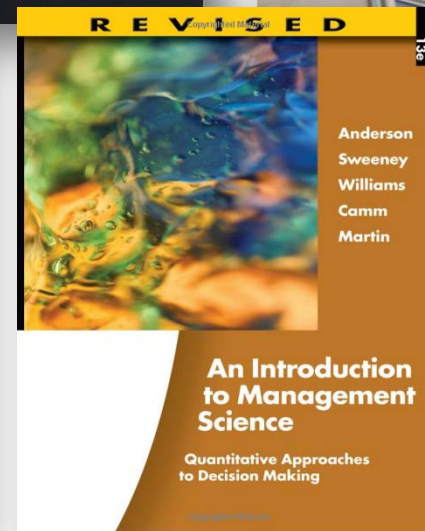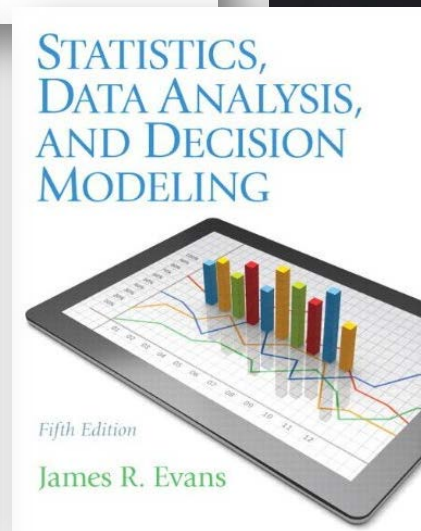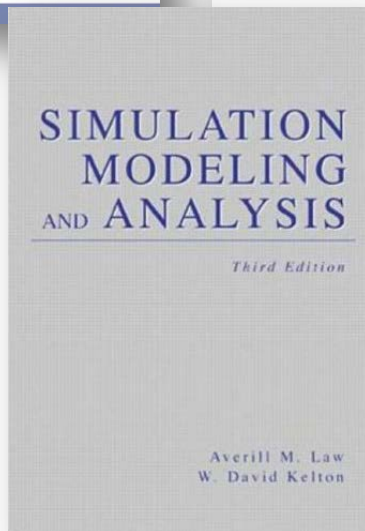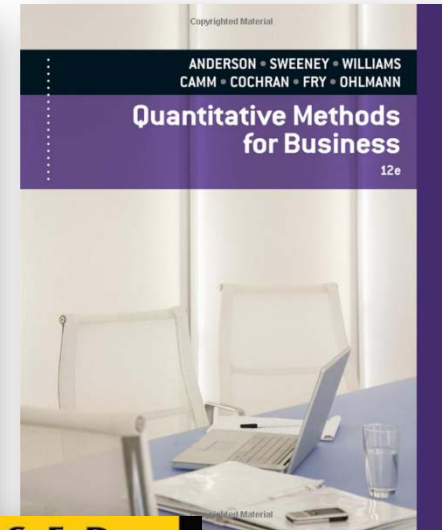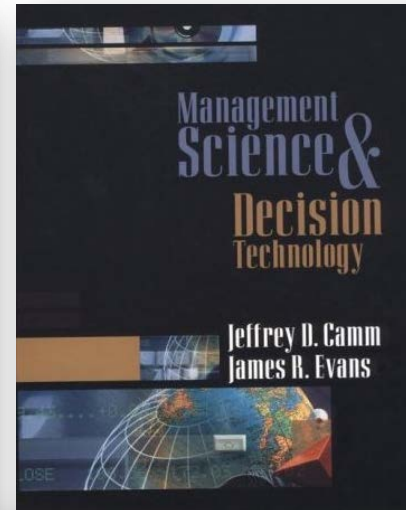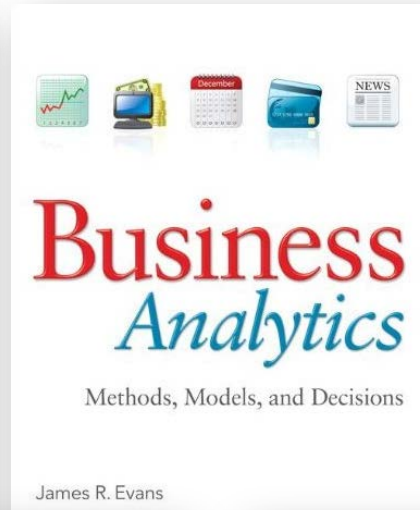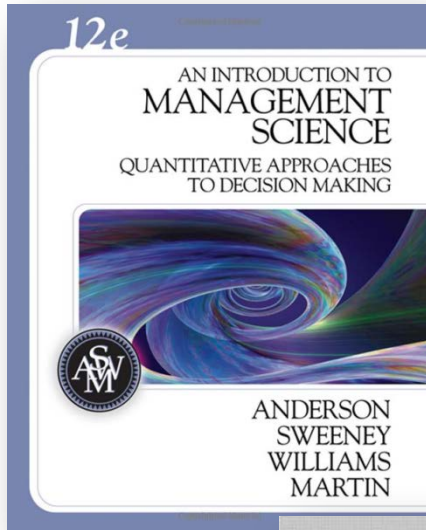
Contact Information

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http://business.uc.edu/departments/obais.html