

# 2010 AIR CONDITIONING CLINIC

September 14 – December 14, 2010

6:00 P.M. – 9:00 P.M.

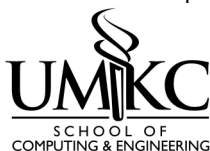
Tuesday Evenings

**UMKC Dental School, Room 217A**

650 E 25 Street

Kansas City, Missouri

Presented by the University of Missouri-Kansas City, and  
the Trane Company, Kansas City Sales District.



Co-sponsored by the American Society of Heating,  
Refrigerating, and Air-Conditioning Engineers (ASHRAE),  
Kansas City Chapter

## Course Description

This course covers the basics of air conditioning. While the approach is a practical one, **this course is not a service school**. Anyone engaged in the design of air conditioning systems can benefit from participation in this course. All topics will be supported by reading material. There will be homework assignments and quizzes.

## Continuing Education Units (CEUs)

3.6 CEUs will be awarded for participation in this program, and will be kept on file at the University of Missouri-Kansas City.

## Course Instructors

The course is coordinated for industry by the district manager of the Trane Company. The instructors are sales engineers from the commercial division of the Trane Company. All instructors and advisors have degrees in their areas of specialization.

**Tobin Bailey, LEED® AP** mechanical engineering

**Jeremy Brock, LEED® AP** industrial engineering

**Robert Colombe, P.E., LEED® AP** mechanical engineering

**Dave Hansen, P.E., LEED® AP** mechanical engineering

**Noel Hankins, LEED® AP** mechanical engineering

**Al Jones, LEED® AP** industrial administration

**Dan Ketelle, LEED® AP** mechanical engineering  
**Matt Kornfeind, LEED® AP** civil engineering  
**Jeremy Lee, LEED® AP** industrial engineering  
**Cory Powell, LEED® AP** industrial engineering  
**Andy Price, LEED® AP** mechanical engineering  
**Mike Gilbert, LEED® AP** mechanical engineering  
**Greg Schnakenberg, P.E., LEED® AP** mechanical engineering

**Bryan R. Becker, Ph.D., P.E.**, is the course advisor. He is a professor of Mechanical Engineering in the School of Computing and Engineering at the University of Missouri-Kansas City (816-235-1255, beckerb@umkc.edu).

**Brian A. Fricke, Ph.D.** is the course co-advisor. He is an assistant professor of Mechanical Engineering in the School of Computing and Engineering at the University of Missouri-Kansas City (816-235-1283, frickeb@umkc.edu).

## Fee

The registration fee for this course is **\$900 (\$850 for registrations received before August 23, 2010)**. The fee includes instruction and all handout materials. Early registration is advised, as class size is limited.

## Cancellation Policy

The University reserves the right to cancel this course and return all fees, in the event of insufficient registration. An individual may cancel a registration on or before September 3, 2010 and receive a full refund. Fifty percent of the fee will be refunded if a cancellation is made on or before September 13, 2010. No fees will be refunded if a cancellation is made after September 13, 2010.

## Parking

Parking is available in UMKC permit parking areas 28A, 67 and 68. UMKC Evening Parking Permits are \$89.00 per semester. Limited on-street parking is available. City meters are \$1.00 per 60 minutes.

Speech and hearing impaired use Relay Missouri, 1-800-735-2966 (TT) or 1-800-735-2466 (Voice)

UMKC is an equal opportunity/affirmative action institution

2010 Air Conditioning Clinic  
ATTN: Bryan R. Becker, Ph.D., P.E.  
UMKC School of Computing and Engineering  
352 Robert H. Flarsheim Hall  
5100 Rockhill Road  
Kansas City, MO 64110-2499

## 2010 AIR CONDITIONING CLINIC CLASS SCHEDULE

### SEPTEMBER 14

**Session 1: HVAC Systems** Understanding HVAC systems: airside, chilled water refrigeration systems and direct expansion systems, system selection (*Jeremy Brock, Matt Kornfeind*)

### SEPTEMBER 21

**Session 2: Load Estimating** Conduction heat loss, conduction and solar heat gain, ventilation and infiltration and internal heat gain using the ASHRAE method and ACCA Manual N (*Cory Powell, Matt Kornfeind*)

### SEPTEMBER 28

**Session 3: Psychrometry 1** Fundamentals and properties of air and their relationship to comfort and to one another, sensible heat ratios, the use of a psychrometric chart (*Dave Hansen, Andy Price*)

### OCTOBER 5

**Session 4: Psychrometry 2** Application of psychrometrics to various systems, variable temperature, reheat double-duct, multi-zone, fan coil variable volume, etc. (*Dave Hansen, Andy Price*)

### OCTOBER 12

**Session 5: Duct Design** Low pressure, high pressure, equal friction method, equal velocity method and static disadvantages of each (*Greg Schnakenberg, Cory Powell*)

### OCTOBER 19

**Session 6: Fans in Air Conditioning 1** Fundamentals, fan laws and their application, FC fans, BI fans, airfoil fans and vane axial fans; applications of various fans to various systems; fan surge, systems surge and paralleling (*Robert Colombe, Jeremy Lee*)

### OCTOBER 26

**Session 7: Fans in Air Conditioning 2** Methods of fan control; variable volume application and selection, exhaust vs. return fans,

acoustical considerations and isolation (*Robert Colombe, Jeremy Lee*)

### NOVEMBER 2

**No Class – Election Day**

### NOVEMBER 9

**Session 8: Chilled Water Systems 1** Current technologies used in chillers, various components differences, thermal storage, energy usage and equipment rating systems, improving building efficiency, reducing installation costs (*Tobin Bailey, Noel Hankins*)

### NOVEMBER 16

**Session 9: Chilled Water Systems 2** Design strategies, components, coil control, evaporator flow, plant designs, control concepts for decoupled systems, DDC controls, sequencing, lead/lag, failure recovery, diagnostics (*Tobin Bailey, Noel Hankins*)

### NOVEMBER 23

**Session 10: Energy Recovery** Fundamentals of energy recovery: coil runaround loops, fixed plate heat exchangers, energy wheels, heat pipes (*Jeremy Brock, Greg Schnakenberg*)

### NOVEMBER 30

**Session 11: Controls** Introduction to fundamentals of HVAC system controls and automation systems (*Dan Ketelle, Al Jones, Mike Gilbert*)

### DECEMBER 7

**Session 12: Final Exam** (*Dan Ketelle, Al Jones, Mike Gilbert*)

### DECEMBER 14

**Session 13: Course Critique and Graduation** Participant recognition and presentation of awards will be held at the UMKC Diastole, 2501 Holmes, Kansas City, MO.

# 2010 AIR CONDITIONING CLINIC

## Three Ways to Register

Web:

Fax: 24-hour FAXLINE 816.235.1260

Mail: 2010 Air Conditioning Clinic  
**ATTN: Dr. Bryan R. Becker, P.E.**  
UMKC School of Computing and  
Engineering  
352 Robert H. Flarsheim Hall  
5100 Rockhill Road  
Kansas City, MO 64110-2499

name

title

organization

address

city, state, zip

office phone

home phone

office fax

e-mail address

**COURSE FEE:** \$900 (\$850 before August 23, 2010)

YES, I want a **PARKING PERMIT:** Add \$89

Please indicate payment method:

Check Enclosed (payable to "UMKC")

MasterCard  VISA  Discover

name as it appears on card

card number

expiration date

amount to be charged

signature

