MEETING LOCATION
The short course will be held at:
Dept. of Food, Bioprocessing & Nutrition Sciences (Schaub Hall)
North Carolina State University
400 Dan Allen Dr.
Raleigh, NC 27607
Phone: 919-515-2957
http://www.ncsu.edu/foodscience

The building (Schaub Hall) is at the corner of Dan Allen Dr. & Sullivan Dr. on the NC State University campus.

The closest airport is the Raleigh-Durham Airport (RDU). It is approximately 13 miles from NC State University.

NEARBY HOTELS
1. Holiday Inn: 919-828-0811 (1.5 miles away)
   1707 Hillsborough St., Raleigh, NC 27605
2. Clarion Hotel: 919-832-0501 (2.5 miles away)
   320 Hillsborough St., Raleigh, NC 27603
3. Holiday Inn Express: 919-854-0001 (3 miles away)
   3741 Thistledown Dr., Raleigh, NC 27606
4. Days Inn: 919-828-9081 (3 miles away)
   300 N. Dawson St., Raleigh, NC 27603
5. Ramada Inn: 919-832-4100 (3 miles away)
   1520 Blue Ridge Rd., Raleigh, NC 27607
6. Sheraton: 919-834-9900 (3 miles away)
   421 S. Salisbury St., Raleigh, NC 27601
7. Raleigh Marriott City Center: 919-833-1120 (3 miles)
   434 Fayetteville St. Mall, Raleigh, NC 27601
8. Comfort Suites: 919-854-0502 (4 miles away)
   1200 Hurricane Alley way, Raleigh, NC 27607
9. Hampton Inn & Suites: 919-233-1798 (5 miles away)
   111 Hampton Woods Lane, Raleigh, NC 27607
10. Candlewood Suites: 919-468-4222 (5 miles away)
   1020 Buck Jones Rd, Raleigh, NC 27606

SHORT COURSE DETAILS
This short course is intended for anyone who would like to understand the fundamental and practical aspects of continuous flow processing of multiphase foods. It will begin with a discussion of the components of a multiphase processing system and the fundamental principles associated with fluid flow, heat transfer, and kinetic considerations that form the basis of quality considerations and process optimization. The need and techniques to measure properties online and offline will then be addressed. This will be followed by an overview of heat exchanger design, thermal process evaluation, process filing (with FDA) and a discussion of advanced volumetric heating technologies such as microwave, radio frequency, and ohmic heating. Attendees will also get an overview of various sensor technologies available for determination of temperature, residence time, and process lethality and an integrated system for process validation will be introduced. There will be a tour of the pilot plant facilities at the Department of Food, Bioprocessing and Nutrition Sciences (Schaub Hall) at NC State University (http://www.ncsu.edu/foodscience) and also an opportunity to see the results of the work performed through the Center for Advanced Processing and Packaging Studies (CAPPS) – http://fst.osu.edu/capps at various times during the short course.
PROGRAM

Tuesday (May 17, 2011)

7:30 to 8:00  Registration & Breakfast

8:00 to 8:15  Welcome & Introductions (Swartzel)

8:15 to 9:15  Components of a multiphase processing system -- Pump, HX, mixer, hold tube, cooler, back pressure device, filler (Sandeep)

9:15 to 10:00 Fluid flow considerations -- Types of fluids & flow, pressure drop, pumping (Sandeep)

10:00 to 10:15 BREAK

10:15 to 11:00 Heat transfer considerations -- Conduction, convection, steady & unsteady heat transfer (Sandeep)

11:00 to 12:00 Kinetic considerations for conventional & volumetric heating -- Safety, quality, and optimization (Swartzel)

12:00 to 1:00 LUNCH

1:00 to 1:30 Properties of multiphase foods: Offline and inline determination -- Viscosity, density, specific heat, thermal conductivity, dielectric properties (Simunovic)

1:30 to 2:15 Design of heat exchangers -- Double tube in detail; triple tube, shell & tube, helical, plate, and SSHE in brief (Sandeep)

2:15 to 3:00  Thermal process evaluation and process filing -- \( F_0 \) value, process time determination, regulations, and forms (Sandeep)

3:00 to 3:15 BREAK

3:15 to 4:00 Volumetric heating technologies -- Microwave, RF, Ohmic (Simunovic)

4:00 to 4:30 Sensors to determine temperature (melting point indicators, thermochromic dyes, chemiluminescent dyes, magnetic thermometry, MEMS-based sensors), residence time (digital video imaging, MRI, laser-doppler-velocimetry, magnetic implants), and process lethality (TTIs, bio-loads) (Simunovic)

4:30 to 5:00 Integrated system for validation of thermal processes -- Design of conservative capsule-sensor system; use of appropriate sensors as implants (Simunovic)

6:30 to 9:30 RECEPTION & DINNER

REGISTRATION

Name: ______________________________

Organization: _________________________

Address: _____________________________

Phone: _____________________________

E-Mail: _____________________________

By Mar. 17  After Mar. 17

Regular       $1,000  $1,200
Govt.         $800     $1,000
Academia      $600     $800

No REFUNDS on cancellations after Mar. 17.

Mail Registration Form to:
Dr. Ken Swartzel
UltrAseptics
19 W. Hargett St., Suite 606
Raleigh, NC 27601-2937

Checks should be made payable to “UltrAseptics Inc.”
For credit card payment, call 919-889-6895

For More Information, Contact:
Dr. Ken Swartzel
ken@ultraseptics.com  919-608-5800

Dr. K.P. Sandeep
kp_sandeep@ncsu.edu  919-515-2957

Dr. Josip Simunovic
josip@ultraseptics.com  919-389-4385

Disclaimer: Under extenuating circumstances, we may have to make substitutions for speakers/topics/times.