

**MME 401**  
**Thermal Sciences Laboratory**  
**Fall 2009**

**Thursday 9:30 – 12:15 (section 1) in ECC 179b**  
**Friday 10:00 – 12:45 (section 2) in ECC 179b**  
**Thursday 12:30 – 15:15 (section 3) in ECC 179b**

**Instructor:** Dr. Kenneth W. Miller, Ph.D., P.E., ECC 101b, (320) 308-5522,  
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**Catalog:** Experimental and numerical labs in the thermal sciences that may include thermodynamics, fluid mechanics, and heat transfer. Lab. Prereq.: MME 200, MME 301, MME 400 (or concurrent), MATH 311, 1 Cr. F.

**Program:** Manufacturing Engineering - Elective  
Mechanical Engineering - Required

**Text:** David F. Beer and David McMurrey, [\*A Guide to Writing as an Engineer\*](#), Second Edition, 2004, John Wiley & Sons, New York, ISBN 0-471-43074-9  
Supplemental material available through the Desire2Learn class website (requires Huskynet ID and password)  
<http://huskynet.stcloudstate.edu/d2l/default.asp>

**References:** Moran and Shapiro, [\*Fundamentals of Engineering Thermodynamics\*](#), Sixth Edition, 2007, John Wiley & Sons, New York; ISBN 978-0-471-78735-8

Bruce R. Munson, Donald F. Young, and Theodore H. Okiishi, [\*Fundamentals of Fluid Mechanics\*](#), Fifth Edition, John Wiley & Sons, New York, 2006; ISBN 0-471-67582-2

Incropera, DeWitt, Bergman, Lavine, [\*Fundamentals of Heat and Mass Transfer\*](#), Sixth Edition, 2007, John Wiley & Sons, New York, ISBN 0-471-45728-0

**Contents:**

<b>Week</b>	<b>Area</b>	<b>Topic</b>
24 August	Thermodynamics	Thermodynamic modeling using TEST
31 August	Fluid Mechanics	Statistics and Viscosity
7 September	Fluid Mechanics	Report writing for viscosity laboratory
14 September	Fluid Mechanics	Wind tunnel demonstration and assignment

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<b>Week</b>	<b>Area</b>	<b>Topic</b>
21 September	Thermodynamics	Tour of Becker Power Plant (Thursday at 10:30 – all sections)
28 September	Heat Transfer	Conduction Modeling with ANSYS
5 October		No meeting – work on modeling projects
12 October	Thermodynamics	Refrigeration
19 October		Fall break – no laboratory
26 October	Heat Transfer	Design of Experiments
2 November	Heat Transfer	Lumped Capacitance Laboratory
9 November	Heat Transfer	Evaporative Cooling
16 November	Fluid Mechanics	Wind Tunnel Testing
23 November		Thanksgiving Holidays – no laboratory
30 November	Heat Transfer	Boiling Convection
7 December		Final Exam

**Grading:**           85%   Reports  
                          15%   Final Exam – last laboratory meeting

**Course Outcomes and Performance Criteria:**

1. Students will have the ability to design experiments in thermal sciences
2. Students will have the ability safely execute experiments in thermal sciences
3. Students will have the ability to analyze experimental results
4. Students will have the ability to write clear and rigorous reports on the results of experimental work

**Correlation between Course Outcomes and [Program Outcomes](#)**

<b>Program Outcomes</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>Course Outcomes</b>												
1. Design Experiments	X	X	X		X		X					X
2. Execute Experiments		X										X
3. Analyze Results	X	X							X			X
4. Write Reports	X	X	X		X		X		X			X