

## ME 431: Design of Solar Thermal Systems

<i>Course description:</i>	Design of solar thermal systems for heating and cooling of buildings, heating of water, electrical generation, industrial processes, and distillation.
<i>Number of credits:</i>	3
<i>Course Coordinator:</i>	R.F. Richards
<i>Prerequisites by course:</i>	ME 301; ME 303; ME 404; certified major in Mechanical Engineering
<i>Prerequisites by topic:</i>	<ol style="list-style-type: none"><li>1. First Law of Thermodynamics</li><li>2. Power and Refrigeration Cycles</li><li>3. Basic Heat Transfer</li></ol>
<i>Textbooks/other required materials:</i>	<ol style="list-style-type: none"><li>1. John A Duffie &amp; William A. Beckman, <i>Solar Engineering of Thermal Processes</i>, Wiley 3<sup>rd</sup> edition 2006.</li></ol>
<i>Course objectives:</i>	<ol style="list-style-type: none"><li>1. Understand the basic principles of design and operation of solar thermal energy conversion</li><li>2. Apply those principles to a wide variety of systems and applications</li></ol>
<i>Topics covered:</i>	<ol style="list-style-type: none"><li>1. Solar Radiation</li><li>2. Solar economics</li><li>3. Photovoltaics</li><li>4. Flat Plate Solar Collectors</li><li>5. Passive Solar Heating Systems</li><li>6. Active Solar Heating Systems</li><li>7. Solar Hot Water Systems</li><li>8. Solar Lighting</li><li>9. Concentrating Solar Collectors</li><li>10. Solar heat engines for electricity generation</li><li>11. Politics and policy</li></ol>
<i>Expected student outcomes:</i>	Upon successful completion of the course, the students will be able to: <ol style="list-style-type: none"><li>1. Understand how to estimate available solar energy for a given site and application</li><li>2. Design a passive solar heating system for a building</li><li>3. Design an active solar heating system for a building</li><li>4. Understand the design and economics of solar thermal power plants</li></ol>
<i>Class schedule:</i>	Three 50 minute lectures per week, for one semester.
<i>Laboratory schedule:</i>	None
<i>Contribution to meeting the professional component:</i>	Engineering Topics
<i>Relationship of course to program objectives:</i>	Meets: <ol style="list-style-type: none"><li>1. School of MME ME educational objectives: 1, 2 and 3</li><li>2. School of MME ME program outcomes: (a), (b), (c), (d), (e), (f), (g), (h), (i), (j), (k)</li><li>3. ABET EC2000, Criterion 3 program outcomes: (a), (b), (c), (d), (e), (f), (g), (h), (i), (j), (k)</li></ol>

## **POLICIES**

### **A. Reasonable Accommodation** (the nature of the particular course determines which one applies):

- Pullman Campus. Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.
- WSU Online Course. Reasonable accommodations are available in online classes for students with a documented disability. All accommodations must be approved through your WSU Disability Services office. If you have a disability and need accommodations, we recommend you begin the process as soon as possible. For more information contact a Disability Specialist on your home campus: Pullman or WSU Online (<http://accesscenter.wsu.edu>), Spokane (<http://spokane.wsu.edu/students/current/studentaffairs/disability/>), Tri-Cities (<http://www.tricity.wsu.edu/disability>), Vancouver (<http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services>).

### **B. Academic Integrity**

WSU expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The Standards of Conduct for Students can be found at <http://conduct.wsu.edu>.

### **C. WSU Safety**

WSU is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, <http://safetyplan.wsu.edu>. It is highly recommended that you visit this web site as well as the University emergency management web site at <http://oem.wsu.edu> to become familiar with the information provided.