SYLLABUS--GEOGRAPHY 411 (U/G, 3 credits)
PHYSICAL CLIMATOLOGY
Fall 2006

Lecture: M 3:30 p.m.-6:10 p.m. (BOL 435)
Instructor: Prof. Mark D. Schwartz, Ph.D. Email: mds@uwm.edu
Office: BOL 490 -- messages may be left in BOL 410 (Geog. Dept.)
Office Phone: 229-3740 Messages: 229-4866 (Geog. Dept.)
Office Hours: by appointment only

Course Objectives
This course is designed to help students gain an appreciation for and basic understanding of the complex nature of climatic processes at the microclimate scale. Budgets of energy, water, and momentum, and soil-plant-atmosphere interactions at the earth's surface will all be explored from both a theoretical and practical point of view.

Main textbook: Rosenberg, Microclimate: The Biological Environment, 2nd Ed. (1983)

The main textbook as well as supplementary handouts are available on reserve in the main library. More information is available at: http://www.uwm.edu/Course/416-411/

COURSE POLICIES

1. Evaluation (undergraduates and graduates will be evaluated separately)

UNDERGRADUATES: Grades will be assigned on the basis of the total points accumulated from tests, exercises, and discussion/participation throughout the semester (370 possible). These will consist of 3 equally weighted exams (100 points each), exercises (total of 50 points), and discussion/participation, including attendance (total of 20 points).

GRADUATE STUDENTS: In addition to the above requirements, graduate students will prepare a 10 page (2500 word minimum) report on a microclimate-related topic with approval of the instructor, which will be worth 50 points. Therefore they will be graded based on 420 points.

The percentages necessary to receive certain grades will be no higher than the following:

- 88%--(A-) 78%--(B-)
- 68%--(C-) 58%--(D-)

2. Notices: Grades, once given, are final except in cases of clerical error. Do not use a red pencil or pen to write exam answers. All tests must be taken as scheduled; make-ups are given in case of documented student illness or other emergency only. It is the responsibility of the student to notify the instructor when an exam or other course requirement will be missed. If you need special accommodations in order to meet any of the requirements of this course, please contact me as soon as possible. Do your own work...plagiarism and cheating are unacceptable and will not be tolerated. Additional information regarding the policies and procedures that apply to this course are at: http://www.uwm.edu/Dept/SecU/SyllabusLinks.pdf, and posted in the Geography Dept. main office, BOL410. See also the Uniform Syllabus Policy at: http://www.uwm.edu/Dept/SecU/facdocs/1895A.pdf.
Suggested additional texts available in the main library:

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
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<tbody>
<tr>
<td>Campbell, G. S.</td>
<td>An Introduction to Environmental Biophysics</td>
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<td>Chang, Jen-hu</td>
<td>Climate and Agriculture-An Ecological Survey</td>
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<tr>
<td>Duffle &amp; Beckman</td>
<td>Solar Engineering of Thermal Processes</td>
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<td>Garratt, J.R.</td>
<td>The Atmospheric Boundary Layer</td>
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<td>Gates, D.M.</td>
<td>Energy Exchange in the Biosphere</td>
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<td>Geiger, R.</td>
<td>The Climate Near the Ground</td>
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<tr>
<td>Lowry, W.</td>
<td>Weather and Life, An Intro. to Biometeorology</td>
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<tr>
<td>Oke, T.R.</td>
<td>Boundary Layer Climates</td>
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<tr>
<td>Munn, R.E.</td>
<td>Descriptive Micrometeorology</td>
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<td>Sellers, W.D.</td>
<td>Physical Climatology</td>
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<td>Strahler, A.H.</td>
<td>The Earth Sciences</td>
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<td>Sutton, O.G.</td>
<td>Micrometeorology</td>
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TENTATIVE SCHEDULE and Readings

Textbook Chapters (Rosenberg-R)
and Course Handouts (H)

Sept. 11-M-Course introduction and procedures
   Energy balance-microclimate measurement
   R-Intro., H1
18-M-Blackbody Radiation Theory
   Solar Radiation (Exercise 1 distributed, 5 points)
   H3
25-M-Terrestrial radiation
   Radiation energy balance and net rad.
   (Exercise 1 due, Exercise 2 distributed, 5 points)

Oct. 2-M-Soil heat flux, conduction
   **Graduate Student paper topic approval due**
   Soil properties and influences
   (Exercise 2 due, Exercise 3 distributed, 10 points)
   R2, H4
9-M-Soil properties and influences
   EXAM ONE
16-M-Soil properties and influences
   Temperatures and lapse rates
   R3, H5
23-M-Sensible heat transfer (Exercise 3 due, Exercise 4 distributed, 10 points)
   **Graduate Student paper outline due**
   Sensible heat transfer
30-M-Field measurement excursion one (weather permitting)
   Field measurement excursion two (weather permitting)

Nov. 6-M-Atmospheric Stability, Wind and effects
   (Exercise 4 due, Exercise 5 distributed, 10 points)
   Wind breaks, local influences
   R4, H6
13-M-Moisture properties
   EXAM TWO
   R5, H8
20-M-Evapotranspiration (Exercise 5 due)
   Soil-Plant-Atmosphere interactions
   (Exercise 6 distributed, 10 points)
27-M-Soil-Plant-Atmosphere interactions (continued)
   Photosynthesis, Respiration (Extra Credit Exercise Distributed)
   R8

Dec. 4-M-Soil modification, Urban climates (Exercise 6 due)
   Windbreaks and shelters
   R6
11-M-Frost control, Water use efficiency
   Biometeorology (Extra Credit Exercise Due)
   R10, R11
   R9
   R12
   Course Review and Evaluation–GRAD. PAPERS DUE!
20-Wednesday-EXAM THREE, 3:00 p.m. - 5:00 p.m.