WATERSHED MODELING
BSEN 4520

Instructor: Dr. Puneet Srivastava  
Rm 206 Corley Building  
Phone: (334) 844-7426; E-mail: srivapu@auburn.edu

1. Credit Hours: 3 credit hours /week for 15 weeks

Prerequisite: BSEN 4510 or department approval

Corequisite: None

2. Text/Major Resources

Textbook: A textbook is not required for this class. We will use journal articles for this course (see example list below).


3. Course Description:

The course covers modeling of non-point source (NPS) pollution at the watershed scale. The transport of nutrients, sediment, pesticides, and pathogens from agricultural, forestry, and urban activities will be simulated using the SWAT (Soil and Water Assessment Tool) model. Emphasis is placed on the underlying processes that control the movement of pollutants through soils and with overland flow. The course will focus on evaluation of best management practices for the management and prevention of non-point pollution of surface and groundwater. Topics include science and policy affecting NPS pollution; climate (energy, atmospheric water, weather generator), hydrology (surface runoff, evapotranspiration, soil water, groundwater), nutrients and pesticides (nitrogen, phosphorus, pesticide), erosion (sediment, nutrient transport, pesticide transport, water quality parameters), land cover/plant (growth cycle, optimal growth, actual growth), management practices (general management, water management, urban areas), and main channel processes (water routing, sediment routing, in-stream nutrient processes, pesticide).
4. Course Objectives:
The specific objectives of the course are to:
(1) Learn processes simulated in the watershed scale, nonpoint source pollution model SWAT;
(2) Understand the linkages among the processes and the importance of spatial and tabular input data and parameters;
(3) Estimate NPS pollution from agricultural, forestry, and urban activities in a watershed using the SWAT model and simulate the effect of best management practices (BMPs);
(4) Learn to perform sensitivity and uncertainty analyses of a nonpoint source pollution model.

5. Course Content and Schedule:

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<th>Week No.</th>
<th>Topic</th>
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<td>1</td>
<td>Introduction</td>
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<td>1-2</td>
<td>Laws, regulations, and Policies Affecting Water-Pollution including TMDL</td>
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<td>3</td>
<td>Climate Simulation in the SWAT model</td>
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<td>4</td>
<td>Hydrologic Equations in SWAT</td>
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<td>Simulation of Streamflows using SWAT</td>
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<td>6</td>
<td>Nutrients/Pesticide Equations in SWAT</td>
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<td>Erosion</td>
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<td>Land Cover/Plant</td>
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<td>Management Practices</td>
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<td>Main Channel Processes</td>
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<td>Mid-term Exam</td>
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<td>12</td>
<td>SWAT modeling of NPS pollution from a Watershed</td>
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<td>12</td>
<td>Sensitivity and Uncertainty Analyses</td>
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<td>13-14</td>
<td>SWAT modeling of NPS pollution from a Watershed</td>
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<td>14-15</td>
<td>Discussion and Project Report</td>
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6. Course Requirements/Evaluation
The grade for the course will be determined from the two in-class mid-term exams, homework sets, and the project report. The exams, or portions of them, may or may not be open book - open notes. The course grade will be determined as follows:

- First Mid-term Exam 20%
- Second Mid-term Exam 20%
- Project Report 50%
- Homeworks 10%
- TOTAL 100%

Grade Assignment
A = 90 - 100 %
B = 80 - 89.9 %
C = 70 - 79.9 %
D = 60 - 69.9 %
F = below 60 %
7. Course Policy Statements:

a. Attendance. Attendance is optional.

b. Deadlines. Homeworks are due when specified. A 10% homework grade reduction per university day will be assessed. Homework will not be accepted after graded homeworks are returned.

c. Homework Format. All homework must be performed on engineering paper or computer printout.

Whether class and/or labs are attended does not relieve the student of responsibility. All covered material including tests, handouts, lecture material, and homework are due when stated regardless of whether the student is present or not.

Excused Absences: Students are granted excused absences from class for the following reasons: illness of the student or serious illness of a member of the student’s immediate family, the death of a member of the student’s immediate family, trips for student organizations sponsored by an academic unit, trips for University classes, trips for participation in intercollegiate athletic events, subpoena for a court appearance, and religious holidays. Students who wish to have an excused absence from this class for any other reason must contact the instructor in advance of the absence to request permission. The instructor will weigh the merits of the request and render a decision.

When feasible, the student must notify the instructor prior to the occurrence of any excused absences, but in no case shall such notification occur more than one week after the absence. Appropriate documentation for all excused absences is required.

Make-Up Policy: Arrangement to make up missed major examination (e.g. hour exams, midterm exams) due to properly authorized excused absences must be initiated by the student within one week from the end of the period of the excused absences. Except in unusual circumstances, such as continued absence of the student or the advent of University holidays, a make-up exam will take place within two weeks from the time that the student initiates arrangements for it. Except in extraordinary circumstances, no make-up exams will be arranged during the last three days before the final exam period begins. The format of the make-up exam will be the same as the examination that was missed.

Cellular telephones: Use of communication devices (e.g. cell phones, cameras, PDAs, beepers, pagers, iPods, Zunes, etc.) are prohibited during class periods and exams. This includes texting during class. If prohibited electronic devices are seen in use during a quiz or exam, they may be confiscated and the student may face disciplinary action through the academic honesty policy.

8. Academic Honesty Statement:

Academic Honesty Policy: All portions of the Auburn University student academic honesty code (Title XII) found in the Tiger Cub will apply to this class. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

9. Students with Disabilities Statement:
**Disability Accommodations:** Students who need special accommodations in class, as provided for by the American Disabilities Act, should arrange a confidential meeting with the instructor during office hours the first week of classes - or as soon as possible if accommodations are needed immediately. You must bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have these forms but need accommodations, make an appointment with The Program for Students with Disabilities, 1244 Halley Center, 844.2096 (V/TT) or email: scw0005@auburn.edu