CWR 4120 (Section 4546) Groundwater

1. **Catalog Description:** (3 credit hours) Introduction to groundwater hydrology, including hydrologic cycle, Darcy’s equation, Dupuit assumption, well hydraulics, regional groundwater flow, water quality and groundwater contamination, groundwater development and management, and numerical groundwater modeling.

2. **Pre-requisites and Co-requisites:** CWR 4202 Hydraulics is a pre-requisite for this course.

3. **Course Objectives:** Students are expected to acquire an introductory understanding of groundwater flow and contamination and to apply mathematical and scientific principles to solve engineering problems that include aquifer test analysis and numerical groundwater modeling.

4. **Contribution of Course to Meeting the Professional Component:** CWR 4120 is an upper division civil engineering course that contributes to satisfying the need for 1.5 years of engineering coursework. The course combines the principles covered in required civil engineering courses such as hydrodynamics and hydraulics and applies these principles to groundwater hydrology.

5. **Relationship of Course to ABET Program Outcomes:**
   - Outcome a): Apply knowledge of mathematics, science, and engineering: 50%
   - Outcome b): Design and conduct experiments, analyze and interpret data: 5%
   - Outcome c): Design systems and components to meet desired needs: 10%
   - Outcome d): Function on multidisciplinary teams: 0%
   - Outcome e): Identify, formulate, and solve engineering problems: 10%
   - Outcome f): Understand professional and ethical responsibilities: 0%
   - Outcome g): Communicate effectively: 5%
   - Outcome h): Understand impact of engineering solutions in a global context: 0%
   - Outcome i): Recognize the need for and engage in lifelong learning activity: 0%
   - Outcome j): Demonstrate knowledge of contemporary issues: 0%
   - Outcome k): Use state-of-the-art problem solving tools and techniques: 20%

6. **Instructor:** Shirish Bhat, Ph.D., P.E.
   - Office location: 580B Weil Hall
   - Telephone: 352-392-9537 extension 1440
   - E-mail: sbhat@ufl.edu
   - Office hours: Monday & Friday 12:40 p.m. – 1:40 p.m.

   **Email communication is highly encouraged** as it allows information to be shared more readily with the entire class. The class email list is automatically generated based upon the class roll maintained by the Registrar’s Office. As such students must have an active University GatorLink email address (typically of the form username@ufl.edu).

7. **Meeting Times:** 5th period (11:45 a.m. – 12:35 p.m.)

8. **Class Schedule and Location:** Monday, Wednesday, and Friday; Weil 234

10. **Course Outline:**

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Topics</th>
</tr>
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<tbody>
<tr>
<td>1 – 2</td>
<td>Introduction, hydrologic cycle, aquifer properties</td>
</tr>
<tr>
<td>3 – 4</td>
<td>Principles of groundwater flow</td>
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<tr>
<td>5 - 6</td>
<td>Hydraulics of wells and aquifer tests</td>
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<tr>
<td>7 – 8</td>
<td>Regional groundwater flow, hydrogeology, water chemistry</td>
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<tr>
<td>9 – 10</td>
<td>Water quality and groundwater contamination</td>
</tr>
<tr>
<td>11 – 12</td>
<td>Groundwater development and management</td>
</tr>
<tr>
<td>13 – 15</td>
<td>Numerical groundwater modeling</td>
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</tbody>
</table>

11. **Attendance and Expectations:** Classroom attendance and participation are expected. Homework assignments should be turned in on their due dates; the grade on a homework assignment and project work turned in late will be deducted at a rate of 10 points per day.

12. **Grading:** Grading will be based on homework, a mid-term examination, and a final examination weighted as follows:

- Homework: 30%
- Mid-Term Exam: 30%
- Final Exam: 30%
- Class Project: 10%

13. **Grading Scale:**

<table>
<thead>
<tr>
<th>Final Average</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>90 to 100</td>
<td>A</td>
</tr>
<tr>
<td>85 to 89</td>
<td>B+</td>
</tr>
<tr>
<td>80 to 84</td>
<td>B</td>
</tr>
<tr>
<td>75 to 79</td>
<td>C+</td>
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<tr>
<td>70 to 74</td>
<td>C</td>
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<tr>
<td>65 to 69</td>
<td>D+</td>
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<tr>
<td>60 to 64</td>
<td>D</td>
</tr>
<tr>
<td>Less than 60</td>
<td>E</td>
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</tbody>
</table>

For more information on grades and grade points, please see: [https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx)

14. **Tests:**

Two 1-hour closed-book, closed notes exams and one class project. The exams are scheduled as follows:  
Exam 1: February 18, 2013; 11:45-12:45 PM (Weil 234).  
Exam 2: April 15, 2013; 11:45-12:45 PM (Weil 234).  
Class project: Due April 24, 2013 at the beginning of class.
15. Homework:
Homework will be assigned regularly.

16. Make-up Exam Policy: Make-up exams will be allowed only in cases of a valid medical excuse or an absence approved in advance by the instructor.

17. Honesty Policy: All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

18. Accommodation for Students with Disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

19. UF Counseling Services: Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
   - University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
   - SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
   - Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
   - Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

20. Software Use: All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.