1. **Catalog Description:** (3 credits) Fundamental equations for pipe and open conduit flow. Development of design oriented formulas for pipes and open channels. Introduction to hydrology.

2. **Pre-requisites and Co-requisites:** CWR 3201 (Hydrodynamics) or consent of instructor.

3. **Course Objectives:** To familiarize the student with the analysis upon which modern hydraulic engineering design is based and with the design process itself. Emphasis is placed on the basic understanding of the potential and unavoidable limitations of today’s methods in hydraulic analysis and design. Provide students a suitable applied background in hydraulics through lectures, assignments, and software applications.

4. **Instructor:** Dr. Mark A. Newman, Ph.D., P.E.
   Office location: 575L Weil Hall
   E-mail address: markn@ufl.edu
   Website: [http://www.ce.ufl.edu/~markn/](http://www.ce.ufl.edu/~markn/)
   Office hours: Tuesday and Thursday from 3:00–3:50 PM (8th period) or by appointment.

   **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 Registrars Office. As such students must have an active University GatorLink email address (typically of the form username@ufl.edu).

5. **Grader:** TBD

6. **Class schedule:**
   - Tuesday and Thursday (Lecture)
     - Period 7, 1:55 PM – 2:45 PM
   - Wednesday (Problem Session)
     - Period 9-10, 4:05 PM – 6:00 PM

   Classes will be held on **Tuesday and Thursday** afternoons during 7th period and a problem session will be held **Wednesday** afternoon during 9th and 10th period—attendance is strongly recommended.

7. **Meeting Location:** Florida Gym, Room 260 (Tue, Wed, and Thur)

8. **Attendance and Expectations:** There is no specific penalty for missing a class; however, attendance is strongly recommended. Students are responsible for the content of each lecture, which may or may not be contained in the course notes.


10. **Course Outline:** (list of topics)

1. Review of Fundamental Hydraulic Equations:
   a) Conservation of Mass, Energy, and Momentum
   b) Energy verses Momentum Coefficients
   c) Combined Applications of Fundamental Hydraulic Equations
2. Unified Approach to Formulas for Pipe and Open Channel Flow:
   a) Introduce concepts of hydraulic radius, energy losses, wall shear stress, friction velocity, and friction factors
   b) Darcy-Weisbach’s equation
   c) Velocity profiles for laminar and turbulent flow
   d) Friction factors for laminar and turbulent flow
   e) Development of rational power formulas for relationship between hydraulic radius, spatial mean velocity, discharge, energy loss, and pipe/channel or fluid properties
3. Empirical Formulas for Pipe and Open Channel Flow:
   a) Chezy’s, Manning’s, and Hazen & William’s formulas
   b) Limitations of empirical formulas
   c) Software application with FlowMaster
4. Local Energy Losses
   a) Introduction to local energy losses
   b) Sudden enlargements and reductions of flow area
   c) Inlets and outlets
   d) Gradual enlargements and reductions of flow area
   e) Bends and knees and valves and gates
   f) Equivalent lengths
   g) Software application with FlowMaster
5. Pipes, Pipe Systems and Networks
   a) Characteristic equation, P-value for pipe, pipe sizes
   b) Pipes in series and parallel
   c) Composite pipe systems and networks
   d) Software applications with FlowMaster
6. Open Channels, Uniform Flow
   a) Normal depth and mean normal depth of rectangular, trapezoidal, triangular, and partially filled circular channels
   b) Optimum design of trapezoidal channels
   c) Specific energy, critical depth, and mean critical depth of rectangular, trapezoidal, triangular, and partially filled circular channels
   d) Software applications with FlowMaster
7. Open Channels, Rapidly Varied Flow
   a) Flow over broad crested weir
   b) Flow over channel obstructions (with supercritical and subcritical flow)
   c) Transitions from subcritical to supercritical flow
   d) Transitions from supercritical to subcritical flow (hydraulic jumps)
   e) Software applications with **FlowMaster**

8. Open Channels, Gradually Varied Flow
   a) Backwater and drawdown curves
   b) Computational methods (the direct step method)
   c) Computational methods (the standard step method)

9. Introduction to Surface Hydrology
   a) Hydrologic Budgets
   b) Precipitation, Runoff, Infiltration, and Evapotranspiration
   c) Storm Runoff Modeling

11. Grading
    Homework 25%
    Three Exams (25% each) 75%

12. Grading Scale:

<table>
<thead>
<tr>
<th>Final Average</th>
<th>Course Grade</th>
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<tbody>
<tr>
<td>94-100</td>
<td>A</td>
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<tr>
<td>90-93</td>
<td>A-</td>
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<tr>
<td>87-89</td>
<td>B+</td>
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<td>77-79</td>
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<td>74-76</td>
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<td>70-73</td>
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<td>67-69</td>
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<td>60-63</td>
<td>D-</td>
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<tr>
<td>&lt; 60</td>
<td>E</td>
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</tbody>
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Information on current UF grading policies for assigning grade points may be found at: [https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx)

13. Tests: Three 1-hour written tests and one 2-hour final exam. The tests and the final exam are scheduled as follows.

   Exams:       Wednesday, February 20, 2012  4:05-6:05 p.m.
                 Wednesday, March 27, 2012   4:05-6:05 p.m.
                 Wednesday, April 24, 2012   4:05-6:05 p.m.
   Final Exam:  Thursday, May 2, 2012       12:30-2:30 p.m.
                (Comprehensive)

   (NOTE: FINAL EXAM IS OPTIONAL AS REPLACEMENT OF ONE PRIOR EXAM)

14. Homework: Homework will be assigned weekly.
15. **Grading Policy:** If there are questions about grading, a written statement must be submitted with a copy of the test problem in question. Once reviewed, the statement and final decision will be returned. No face-to-face grade lobbying will be permitted.

16. **Make-up Exam Policy:** Must make arrangements with the instructor in advance of the exam.

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.