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:** 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  
   Office location: 580A Weil Hall  
   E-mail address: mark.newman@essie.ufl.edu  
   Web site: [http://www.essie.ufl.edu/~markn/](http://www.essie.ufl.edu/~markn/)  
   Office hours: Monday, Wednesday, Friday 1:30PM – 2:30PM (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 Registrar’s Office.

5. **Meeting Times:**
   
   Section 0916: Tuesday Periods 6-7  (12:50 AM – 2:45 PM)  
   Section 2D41: Thursday Periods 6-7  (12:50 PM – 2:45 PM)

6. **Meeting Location:**
   
   Engineering Building (NEB), Room 101

7. **Course material and assignments:**
   
   All course material (lectures, reading, homework, and supplemental information) will be provided through UF e-Learning site [http://elearning.ufl.edu/](http://elearning.ufl.edu/).

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 session, which may or may not be contained in the online lectures and course notes.
9. **Referenced Textbooks:**
   No textbooks are required—all reading assignments will be posted on course site.


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

    1. Review of Fundamental Hydraulic Principles:
       a) What is hydraulics?
       b) Behavior of real fluids (e.g. water)
       c) Classification of flows
       d) Conservation of Mass, Energy, and Momentum
       e) Energy verses Momentum Coefficients
       f) Combined Applications of Fundamental Hydraulic Principles

    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

    4. Local Energy Losses
       a) Introduction to local energy losses (inlets, outlets, enlargements, reductions, bends, knees, valves, and gates)
       b) Equivalent lengths

    5. Pipes, Pipe Systems and Networks
       a) Characteristic equation, P-value for pipe, pipe sizing
       b) Pipes in series and parallel
       c) Composite pipe systems and networks

    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
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)

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. Hydraulic Machines
   a) Classification of hydraulic machines
   b) Pump and system characteristics
   c) Pump design

11. Grading
   Homework  25%
   Three Exams (25% each) 75%
   (Note: the Final Exam is an optional replacement of one prior exam)

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>
</tr>
<tr>
<td>90-93</td>
<td>A-</td>
</tr>
<tr>
<td>87-89</td>
<td>B+</td>
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<tr>
<td>84-86</td>
<td>B</td>
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<tr>
<td>80-83</td>
<td>B-</td>
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<td>67-69</td>
<td>D+</td>
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<tr>
<td>64-66</td>
<td>D</td>
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<tr>
<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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13. Exams: Three 1-hour written exams and one 2-hour final exam (optional). The tests and the final exam are scheduled as follows.

<table>
<thead>
<tr>
<th>Location and Time</th>
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<tbody>
<tr>
<td>Exams: Tuesday, February 12  LIT 0109 (6:15 – 8:10PM)</td>
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<tr>
<td>Thursday, March 21  FLG 0210 (6:15 – 8:10PM)</td>
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<tr>
<td>Thursday, April, 18  FLG 0210 (6:15 – 8:10PM)</td>
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<tr>
<td>Final Exam: Monday, April 29  NEB 101 (5:30 - 7:30PM)</td>
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Important Information Regarding the Final Exam:
- The Final Exam is optional as a replacement for one of the prior three exams.
- The Final Exam can only help you, it will not count against you if you do poorly.
• The Final Exam is cumulative.

14. **Homework Assignments:** Homework will be assigned weekly through the UF e-Learning Canvas site [http://elearning.ufl.edu/](http://elearning.ufl.edu/), and will be the basis for class discussion. All homework will be submitted by completing an online Quiz (Assessment) related to that week’s homework. Starting the second week of class, the weekly online Quiz (Assessment) will always be due Thursday by 5:00PM.

   **Late Assignments:** You will have one week after an assignment deadline passes to contact me and discuss/request the possibility of the assignment being opened for resubmission. **After one week has passed from the quiz deadline no resubmissions will be allowed.**

15. **Grading Policy:** No face-to-face grade lobbying will be permitted during class. If there are questions about grading, a **written statement must be submitted** along with the assignment or exam with the student’s original work. The written statement must clearly state how the problem was originally solved and why additional points are being requested. Once reviewed, the statement and final decision will be returned.

16. **Make-up Exam Policy:** Make-up exams are to be scheduled with 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.

   **UF Honor Code:**

   **ASCE Code of Ethics:**

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 students 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.