FORM I: SUMMARY PAGE FOR PROPOSAL # CIVT102010-14

1. **Title:** CIVT 3311: Engineering Hydrology

2. **Submitting College:** COST

3. **Department(s) Generating the Proposal:** Department of Engineering Technology and Mathematics

4. **Effective Date:** Fall semester 2011

5. **Brief Summary of Proposal:**
This proposal is being submitted to increase the number of elective class options that civil engineering technology majors can take to complete their degree. Adding elective classes will assist with the issue of students having to wait longer to take required classes.

6. **Type of Proposal:** New course

7. **Graduate School Endorsement Status:** N/A

8. **Impact in Library Holdings:** none

9. **Impact on Existing Programs:** none

10 **Additional Resources Required:** none

11. **Approvals:**

This change was approved by:		Date
_____	Department of Engineering Technology	_____
_____	College of Science & Technology	_____
_____	Curriculum & New Programs Committee	_____
_____	SSU Faculty Senate	_____

FORM II - COURSE ADDITION FORM FOR PROPOSAL #CIVT102010-14

A. Course Number: CIVT 3311

B. Course Title: Engineering Hydrology

C. Catalog Description:
Hydrologic cycle; water budget; precipitation data analysis; evaporation & transpiration; hydraulics of groundwater flow; equilibrium and non-equilibrium conditions; groundwater exploration; surface runoff; hydrograph analysis; flood routing; hydrological forecasting; computer applications

D. Rationale: This course is created by the request of the faculty and the CIVT program Industrial Advisory Board. The course reflects the knowledge and skills that our students will need upon graduation as a result of change in global demand in civil engineering.

E. Impact on Library Holdings:
Existing:
Additions:
Deletions:

F. Credit Hours: 3 Credit Hours

G. Prerequisites: CIVT 3301K

H. Syllabus: Copy attached

I. Similarity to, or Duplication of, Existing Courses: N/A

J. Textbook Selection (include title, author and ISBN)

K. Grading (letter grade, pass/fail, S/U etc.): A - F

L. Bibliography:

Savannah State University
CIVT 3311 Engineering Hydrology

COURSE DESCRIPTION (CATALOG DATA):

Hydrologic cycle; water budget; precipitation data analysis; evaporation & transpiration; hydraulics of groundwater flow; equilibrium and non-equilibrium conditions; groundwater exploration; surface runoff; hydrograph analysis; flood routing; hydrological forecasting; computer applications

Credit Hours: 3
Prerequisites: CIVT 3301K

EXPECTED STUDENT LEARNING OUTCOMES:

The student shall learn the principles and applications of engineering hydrology. These will provide the students with all the tools for analysis, management and simulation used for the design and operation of water resources systems and facilities like dams, canals, bridges, sewer systems and irrigation systems. The student will have a good understanding of:

* principles of hydrologic cycle and water budgeting
* Measurement & analysis of precipitation and evaporation
* groundwater movement concepts, well yields & pumping tests
* runoff calculation, analysis, and design of storage reservoirs
* techniques of hydrologic forecasting and simulation

CORE COMPETENCIES:

The course shall emphasize, among others, on the following core competencies:

- Quantitative reasoning and mathematics
- Scientific reasoning

TEXTBOOK: Philip B. Bedient , Wayne C. Huber, and Baxter E. Vieux, Hydrology and Flood Plain Analysis, Addison Wesley, 2008

SUPPLEMENTAL RESOURCES:

David A. Chin: Water Resources Engineering, Prentice Hall, 2007

Ralph A Wurbs & Wesley P. James: Water Resources Engineering, Prentice Hall, 2002

Ram S. Gupta: Hydrology and Hydraulic Syatems, Waveland Press, Inc. 2001

CLASS ATTENDANCE POLICY:

Credit may not be awarded if the number of absences exceeds the number of times that the class meets per week - namely 3 hours. Punctuality will be strictly enforced.

METHODS OF INSTRUCTION & ASSESSMENT:

Tutorial Sessions:
A number of tutorials (problem-solving) will be held, and each student must have his scientific calculator during all the classes. These sessions will provide ample opportunity to ask questions, to clear doubts, to improve problem-solving skills, and to understand practical applications. Computer usage will form part of these sessions.

Home assignments:
Use of library facilities and internet resources shall be incorporated. These should be submitted in time. Late submissions will not be accepted for evaluation

Course Folders:
All tutorial sheets (question papers and answer sheets), assignments and test papers shall be placed in a Course Folder. The Course Folder must be submitted on specified dates (to be announced in the class).

Tests and Final Examination:
These should be taken on the dates and times which shall be announced at least one week in advance. No make-up tests will be given except under extremely special circumstances.

GRADING POLICY:

The final grade for indicating the quality of academic work represents the student's successful performance in all the instructional areas of this Course.
The final evaluation shall be based on the following:

Home assignments, and tutorials:	30%
Tests:	30%
Final examination:	40%

A	Excellent	85 - 100
B	Good	70 - 84
C	Average	60 - 69
D	Poor	50 - 59
F	Fail	< 50

ACADEMIC IRREGULARITY:

Academic honesty will be enforced as an essential component of student conduct as detailed in the University Catalog.

DISABILITY ACCOMMODATIONS:
If a student has a documented and declared disability, reasonable accommodations will be provided if requested by the student according to the recommendations of the office of Counseling and Disability Services (CDS)
(912) 356-2285/(912) 303 1650/(912) 356-2202.

INSTRUCTIONAL UNITS

A. Introduction:
Hydrologic cycle; earth's water inventory; precipitation: precipitation measurement; missing precipitation data, double mass analysis for consistency, computation of average aerial precipitation; Thiessen Polygon & isohyetal methods; intensity-duration-frequency analysis; depth-area-duration analysis
2 weeks

B. Evaporation & Transpiration:
Evaporation & transpiration processes; methods of estimating evaporation; water budget, energy budget and empirical formulae; Penman's method; evaporation pans; lysimeter measurement.
1 week

C. Surface Runoff:
Watersheds & streams; stream gauging; discharge measurement methods; rating curves; velocity- area method, flow measuring structures, dilution gaging; adjustment & extension of rating curves; rainfall-runoff correlation; rational method hydrographs; hydrograph analysis; separation of base flow; unit hydrograph; derivation; unit hydrograph from complex and multi-period storms; estimation of streamflow from unit hydrograph; synthetic unit hydrograph.
Storage reservoirs; required capacity; mass curve methods; reservoir storage-yield relations; sedimentation of reservoirs; flood routing 6 weeks

D. Infiltration and Percolation:
Infiltration capacity of soil; factors influencing and methods of determining infiltration capacity; infiltrometers; Φ index; average method; percolation ½ week

E. Groundwater:

Occurrence of groundwater; Aquifers and other formations; water table; hydraulics of groundwater flow; parameters of storage and movement; porosity & permeability; specific retention and specific yield; storage coefficient and specific storage; Darcy' law; applications; flownet techniques; hydraulics of wells; equilibrium conditions - unconfined and confined aquifers; steady and unsteady state flow conditions; Theis equation; aquifer test analysis; Type-Curve method and Cooper-Jacob method; well near stream & boundaries; theory of images; interference of wells; introduction to monitoring and development of wells

5 weeks

F. Hydrological forecasting:

Introduction to hydrological forecasting; concept of probability in hydrology; recurrence interval/return period; cumulative probability; graphs; design flood for hydraulic structures; type, quality and adequacy of data; probability graph papers; examples of normal, lognormal and extreme value distributions.

1½ week

Civil Engineering Technology Program Outcomes

The educational objectives of the program are prescribed and achieved to demonstrate the following outcomes:

1. The graduate will have the engineering competence with ability to identify and analyze engineering problems and to apply knowledge, techniques and skills in creatively designing and maintaining systems for solving those problems

2. The graduate will have a good understanding of mathematics, science, technology, engineering, and computational methods and an aptitude for life-long learning for continuous improvement and to solve current and future problems at the regional and global level

3. The graduate will develop an ability to conduct experiments, analyze the data for engineering applications, and ensure quality control

4. The graduate will have the ability to function in multidisciplinary teams, assume societal and ethical responsibilities, communicate effectively, and contribute to the advancement of the art and science of engineering technology

As an ABET-accredited program, the Civil Engineering Technology program totally embraces the following Program Outcomes:

a. an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines
b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology
c. an ability to conduct, analyze and interpret experiments, and apply experimental results to improve processes
d. an ability to apply creativity in the design of systems, components, or processes appropriate to program objectives
e. an ability to function effectively on teams
f. an ability to identify, analyze and solve technical problems
g. an ability to communicate effectively
h. a recognition of the need for, and an ability to engage in lifelong learning
i. an ability to understand professional, ethical and social responsibilities
j. a respect for diversity and a knowledge of contemporary professional, societal and global issues
k. a commitment to quality, timeliness, and continuous improvement

The Course CIVT 3XXX (Engineering Hydrology) lays special emphasis on the outcomes a, b, e, f, g, h, j, and k.