Instructor: Dr. Bethany Neilson
Office: ENGR 223 /UWRL 242
Phone: 797-2772/797-7369
Email: bethany.neilson@usu.edu

Class Hours: Monday, Wednesday 10:30-11:45, EL 221 (4 credits)
Laboratory/ Field Trips: Thursday 1:00-4:00, TBA (0 credits)

(http://www.waveland.com/Titles/Chapra.htm)

Course Prerequisites:
Calculus I and II; basic chemistry and physics; Microsoft Excel proficiency, and other courses
that teach problem solving skills. While this class does use some chemistry, it only requires basic
concepts learned in the chemistry class required for both Civil and Environmental Engineering
degree programs.

Course Overview:
This course will teach students the basics of how water, heat, and mass (nitrogen, phosphorus,
oxygen) changes while moving into, out of, and through streams, rivers, and lakes. These
concepts will be tied to real world problems associated with watershed management, source
water protection, and the legal requirements within the Clean Water Act. This class will be
quantitative and will require mathematical formulations and programming (most commonly
VBA), but will also incorporate field data collection for use in the models.

Objectives:
Students that take this course should learn the basic concepts behind water quality modeling,
data requirements for water quality modeling, how to write simple water quality models, how to
apply typical instream water quality models (e.g., QUAL2K), how to calibrate water quality
models, and how to interpret model results given uncertainty. This course is important for those
involved in any water related topics because although this may not be your emphasis, a lot of
environmental and water quantity related research or consulting is geared towards preventing or
understanding the movement of water and constituents that eventually end up in our surface
waters.

So what does this mean? It means that by the end of the class, you will be able to identify the
data needed to understand how a system works, collect field data, write code (i.e., a model) that
can be used to represent all the processes affecting the system, and/or use existing modeling
tools. Together these skills will help you determine what could be changed in a watershed to
meet the instream water quality standards that sustain fisheries and other intended uses (e.g.,
aricultural diversions or drinking water) for water in streams, rivers, and lakes. Most civil
engineering companies with a water resources division would be interested in having someone
with these data collection and modeling skills.