

CEE 4606-001: Environmental Capstone Design

Spring 2017

Class meetings: Tuesday: 2:30 p m – 5:15 pm Tolentine Hall 308

Instructors: **Wenqing Xu**, Ph.D.
140 Tolentine Hall
(610) 519 8549
wenqing.xu@villanova.edu
Office hours: T noon-2:00pm; or by appointment

Danielle Farrell, P.E.
danifarrell@yahoo.com or danielle.brodecki@villanova.edu
Office hours: By appointment

Introduction and course objectives

Design Topic

The 2017 environmental capstone project is to design a reclaimed water system for beneficial reuse facility to provide irrigation water at a county-owned golf course.

Background

A county-owned golf course has a ground water well which is used for irrigation of the recreational facility. In order to maintain an attractive course and keep membership up, the facility has drawn more water out of the well than permitted by the Department of Environmental Protection (DEP). The DEP has imposed steep fines on the golf course but offers a deal: if the course invests the fines into a sustainable alternative which produces reclaimed water for beneficial reuse, the DEP will match the financial investment as a grant.

The Golf Course is situated in an environmentally constrained location which presents challenges for construction including wetland areas and threatened/endangered species. Additionally, the property was obtained by the county through use of Federal Dollars so any development on the land requires approval from the public.

The project team will take the above into consideration as part of their evaluation of alternative water sources (ground water, potable water, surface water, sewage, treated effluent) and prepare a cost-benefit analysis recommendation for the county for future irrigation needs.

Course Objectives:

Students will be required to:

1. present their project in front of the local planning board for approval;
2. design the water treatment/storage/delivery system to deliver the irrigation water to the golf course; and
3. prepare and advertisement of the work for a contractor to bid on the project.

Course policies

Although we will not necessarily meet every week, you are expected to be available during the class meeting period, Tuesday 2:30 to 5:15 PM. If class or the design team is meeting, attendance is required and you are expected to be prompt.

The fellow team members will evaluate your attendance and overall contribution to the design project. In the extreme case where a team member becomes a nonperformer, the instructors will make a decision whether “firing” of the nonperforming team member is warranted after individual discussions with each of the team member and “firing” means failing the course.

Texts and reading materials (not required)

Domestic Wastewater Facilities Manual, PA Department of Environmental Protection.362-0300-001. Available online at <http://www.dep.state.pa.us>

Recommended Standards for Wastewater Facilities. 2014 Edition available online at <http://10statesstandards.com>

Silyn-Roberts, H. (2005). *Professional Communications: A Handbook for Civil Engineers*. ASCE, Reston, VA.

Tchobanoglous, G., Stensel D.H., Tsuchihashi, Ryujiro, and Burton, F.L., and (2014) *Wastewater Engineering: Treatment and Resource Recovery*, 5th ed., McGraw-Hill, Inc., New York. ISBN: 978-0-07-340118-8.

Grading policy

Your final grade will be based on the following four components and scale:

- Three progress reports and presentations: 30% (10% each)
- Final report: 40%
- Final presentation: 20%
- Individual performance: 10%

Faculty members are responsible for maintaining the integrity of the evaluation and grading system. Presented below is a specific description of Villanova’s Undergraduate Grading System. If you accumulate the associated point totals, you will be guaranteed the corresponding letter grade. Point cut-offs may be lowered at the discretion of the instructors at the end of the semester.

94-100%	A	73-76%	C
90-93%	A-	70-72%	C-
87-89%	B+	67-69%	D+
83-86%	B	63-66%	D
80-82%	B-	60-62%	D-
77-79%	C+	Below 60%	F

Progress reports

A minimum team size of two design engineers will be responsible for orally communicating each progress report to the instructors (and possibly other observers). All members of the team must be prepared to answer questions. You are encouraged to consult Chapters 4 and 5 of *Writing and Speaking for Technical Professionals*.

CEE Day

You will prepare a final oral presentation to describe the results of your work for CEE Day (April 28, 2017). You should create a presentation that you would feel comfortable giving to a town hall meeting. This means that you will need to create a presentation that conveys your technical results to the “typical” layperson. Your presentation must be submitted to your instructor by 6 pm on April 27, 2017. **You must stay for all presentations.** Your grade will be penalized for leaving early. You are urged to consult Chapter 18 of *Professional Communications* when creating your slides.

Final written reports

Your final written report is due on May 2, 2017 at 2:00 pm in TL 308. All members of the team must be present to turn the report and complete the senior exit survey afterwards.

You are encouraged to consult Chapters 1 through 7 of *Professional Communications*. This is a professional document and, as such, must have all of the elements of a formal report including:

- executive summary
- table of contents with a list of tables and figures
- appropriate subheadings
- a set of professional, scaled, drawings
- appropriate references
- complete, easy-to-follow calculations that have been checked by a member of the team (in an appendix)

This report should be thoroughly proofread before it is handed in. The design team should designate *at least* one person as the editor and another person as the proof reader to ensure that the sections of the document flow seamlessly and that spelling and grammatical errors have been corrected.

Academic integrity

Students who violate University rules on academic integrity are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from Villanova. Remember, as an engineer, you are also held to a high standard of ethical conduct. Please consult the university’s website on academic integrity if you have any questions:

<http://www.vpaa.villanova.edu/academicintegrity/code.html>.

A key component of academic integrity is properly citing your sources. You are encouraged to consult Chapter 14 of *Professional Communications*.

Disability accommodations

It is the policy of Villanova to make reasonable academic accommodations for qualified individuals with disabilities. If you are a person with a disability (non-physical) please register with the Learning Support Office by contacting Learning.support.services@villanova.edu or 610-519-5176 as soon as possible. Registration is needed in order to receive accommodations.

The Office of Disability Services collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The ODS provides Villanova University students with physical disabilities the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed disability and plan to utilize academic accommodations, please contact Gregory Hannah, advisor to students with disabilities at 610-519-3209 or visit the office on the second floor of the Connelly Center.

Design Teams

- 1) One design engineer in your team will represent the entire design group as the project manager. Elect a project manager at your first team meeting. The project manager will handle the administrative work including scheduling the meetings with client, setting up team meetings, and making sure minutes of team meetings are recorded. In addition, you may want to choose a recorder to take meeting minutes that you are required to submit with each progress report. This does not mean that project managers or the recorders will have a bigger responsibility for the design work.
- 2) A formal *letter of intent* to the client that introduces your firm's project manager and design engineers, and states your firm's intent to perform the design work is due by January 24, 2017 (include formal resumes).
- 3) Team leader is to provide a short weekly brief of the teams activities (via email to the instructors) each Friday.
- 4) Each member of the team must contribute to the project equally. Although the finished product will be judged according to the collaborative efforts of team members, performance of each team member will be assessed through peer evaluations and consultations with other team members. In rare cases where a team member does not contribute to overall outcome, he/she may be dismissed from the team with a failing grade.

Important Dates

January 17, 2017: First day of class; topic = Letter of Intent.

January 24, 2017: topic = Site Selection

January 31, 2017: topic = General Process Flow Diagram

week of February 6, 2017: field trip to site plan hearing (date to be determined)

February 14, 2017: Progress Report I due (in the form of a site plan hearing, renderings)

February 21, 2017: topic = Treatment Processes

February 28, 2017: topic = Pump Station Design

March 7, 2017: no class, Spring Break

March 14, 2017: topic = Gravity Sewer Design

March 21, 2017: Progress Report II due (90% design complete, PowerPoint)

March 28, 2017: topic = Considerations for Support Discipline Design

April 4, 2017: topic = Scope of Work and Cost Estimating (Bid Form)

April 11, 2017: topic = Funding and Permitting

April 18, 2017: Progress Report III due, as draft final report (submitted to the instructors)

April 28, 2017: Final presentation during CEE Day

May 2, 2017: Final Report due at 2pm