SYLLABUS – SUMMER ABROAD 2014

SUBJECT TO CHANGE

Water Quality Management, Dept. of Civil & Environmental Engineering
University of California at Davis – NUIG Dunican Theatre Microbiology Dept//104 Orbsen Bldg
ECI 148A (4 units quarter system)/ECI 198 (4 units, quarter system)

Grading: Class and field trip on time attendance is required
Daily class/homework (50%) and open notes comprehensive final exam (50%).
ECI 148A credit: 40 hours of class attendance/participation plus 80 hours of out-of-class
homework/study. Average of 10 hrs lecture/wk plus 20 hrs HW & study/wk.
9 am to 1 pm with 30 minute tea break (3.5 hrs/day)
ECI 198 consists of the field trips (4) plus the guest lectures with summary papers

Homework Expectations:
Given: All given information and the values of constants, including sources, should be listed.
Provide a sketch or diagram when possible.
Find: A brief statement of the problem objective
Solution: Provide a step by step (numbered) solution. The governing equations needed should be written
in algebraic form before substituting any numbers. If equations must be derived, show the derivation.
Present each step in a manner that can be understood by a colleague. If the solution involves a
programmable calculator, spreadsheet or graphical technique, briefly describe the logic and show a
sample calculation...Make clear any assumptions you had to make in solving the problem.
Answers: Clearly indicate answers (e.g., box, underline, circle or highlight). Include relevant units and
comment appropriately.

Handouts (basis for lectures, class/homework, and final exam)
Lecture 1: Hydrologic cycle & introduction of impurities into water, sampling concepts, solids analysis
Lecture 2: Chemistry concepts relevant to water quality
Lecture 3: Chlorine chemistry (good example of redox, effects of pH, and interferences with treatment)
Lecture 4: Disinfection (good example of mass balances and kinetics)
Lecture 5: Adsorption (good example of equilibrium reactions, empirical coefficients, and mass transfer)
Lecture 6: Indicator organisms: usefulness, limitations, and analysis (good example of dilution to
extinction concept, probability analysis)
Lecture 7: Organic matter and its measurement
Lecture 8: Dissolved oxygen and biochemical oxygen demand (BOD)
Lecture 9: Modeling of flows and reactions in ideal reactors (PFR and CSTR)
Lecture 10: Water and wastewater treatment processes (also field trips to 3 plants)
Lecture 11: Nitrogen

Additional Handouts
1. Galway Hunt
2. Aran Island information (FYI)
3. Writing tips (for summary of Aran Islands and the Burrens National Park trips)
4. Field trip questions (for field trips to W/WWTP)
5. Take home questions (qualitative answers)
6. USEPA regulations
7. Outreach to small systems
Background Reading in Textbook (if you want to supplement lecture notes)

Introduction, Sources & uses of water 1.1 – 1.7
Determinants and importance of water quality, Physical characteristics 2.1-2.4, 3.1, 3.4-3.6
Chemical characteristics of water 2.5-2.7, 3.2
Biological characteristics of water 2.8, 3.3
Modeling principles: stoichiometry, reaction kinetics, mass balances 5.1-5.7
Ideal reactor models: CSTR & PFR 6.1-6.4
Non-ideal reactor models 6.4-6.6
Introduction to water & wastewater treatment 11.1-11.5

Schedule of Activities—2013 DATES LISTED AND SUBJECT TO CHANGE FOR 2014

1. June 30, On site orientation starting at 3 pm at Corrib Village Reception, ending with group dinner
2. Unless otherwise noted below: July 1 – July 26 on M-F, 9 am to 1 pm (tea break at 11), regular class in NUIG Duncan Theatre, Microbiology Dept. Computer and work table access for homework in 104 Orbsen Bldg
3. July 4 group dinner celebration
4. July 5, Friday, Field trip: Aran Islands, overnight stay (meet at bus station, Galway Centre), bus/ferry to Aran Islands, guided bike tour, Cyril 12:30 pm at hostel (cultural/historical/water supply situation), overnight stay, group lunch, dinner, breakfast, lunch, return Saturday July 6 evening
5. July 11, Thursday (meet at Corrib Village reception), Healy Coach to The Burren National Park. Guided day hike (10 am, Tony, Kinvara) and visit to Burren Centre Museum and overnight stay in Doolin followed by 1 hour cruise to Cliffs of Mohor. Group lunch, dinner, breakfast, lunch. Return by Coach Friday, July 12 evening.
6. July 15, Monday 8 pm, Roisin Dubh, Galway Arts Festival group activity: Choice Music nominees and Irish musicians Ellie and Louise Macnamara (aka Heathers) were invited earlier this year to perform for Steven Spielberg and JJ Abrams at the Oscar party of the Hollywood director in Santa Monica. They have enjoyed at the Roisin Dubh. There are MANY other venues for the Festival, some are free, some are very expensive, plays, dance, music, etc. See their web
7. July 17, Wednesday, 9 am, Prof Stephen Nash, NUIG Civil Engineering Professor, Trophic Status of Cork Harbor
8. July 18, Thursday (meet at Corrib Village reception), Healy Coach to Luimneagh (Headford) Potable Water Treatment Plant and Tuam Wastewater Treatment Plant, on-site lectures/tour by plant managers (Brendan McDonagh). Return by 5 pm
9. July 23, Tuesday, 10:30 am, Day Field trip: Galway Wastewater Treatment Plant at Mutton Island, Martina, Walk from Corrib Village, wear flat closed toe shoes plus raincoat
10. July 25, Thursday, 104 Orbsen Bldg, GIS short course, Applications in water quality management, Dr. Ronan Hennessy, NUIG
11. July 26, Friday, final exam, 9 am. Group farewell dinner

Two other guest lectures are likely (on the topics of anaerobic digestion and past cryptosporidium outbreak)

Another good weekend day trip (not yet scheduled but good for both individuals or groups) is to take the public bus at 9:15 to Letterfrack, Connemara National Park (2 hr trip, 12 euros/round trip student), hike Diamond Hill (2.5 hr round trip), walk 5 km to Kylemore Abby (10 euros/student entrance fee, ~2 hr). Returned by public bus to Galway about 6 pm. (2 hr bus, 2.5 hr hike, 2 hr Abby, 2 hr bus = 8.5 hr)