SUMMARY of Course & Curriculum for 2016-2017 Catalog

School of Engineering
Update the Supplementary Scholastic Standards

Biomedical Engineering
Updated pre-requisites
Added Honors and Advanced Calculus for regular courses
Changed W from Mechanics course to Senior Design II
Added Junior Design to BME elective
Updated track electives

Chemical Engineering
Changed the W from Lab course to Senior Design Capstone II
Renamed a few lab courses
Limited enrollment to School of Engineering in 3000 and 4000 level CHEG courses

Civil Engineering
Updated Structural aspects of curriculum
Cross listed a new course with Geography
Updated Statistics requirements
Changing credit structure for some courses and increasing Professional Requirements to 24 credits

Computer Science & Engineering
Requiring all CSE/CS majors to complete CSE 1010 and CSE 1729
Creating a new integrated course to replace two existing courses
Added new required course - CSE 2050
Added concentrations to CSE majors
Updated pre-requisites due to new course
Updated other pre-requisites

Electrical & Computer Engineering
Updated Computer Engineering curriculum due to CSE changes

Engineering
Added a new ENGR course for the Human Rights minor
Added two new courses for the Manufacturing Minor (replace existing courses) and updated the list of electives

Environmental Engineering
Add a Lab to Fluid Mechanics

Management & Engineering for Manufacturing
Updated technical elective requirement
Add a new course for visiting students
Change MSE 2001/2101 requirements
Supplementary Scholastic Standards

In order to be admitted to their junior year in their selected major in the School of Engineering, each student must have a cumulative grade point average of at least 2.0 in all courses in mathematics, sciences, and engineering applicable toward the degree.

Replace with the following (catalog copy):

Supplementary Scholastic Standards

In order to be in good academic standing in the School of Engineering, you must maintain a minimum of 2.5 Cumulative GPA after you have completed 24 credits or above. Students will need a minimum of 2.3 Cumulative GPA to continue in the School of Engineering. If you fall below the 2.3 after 24 credits in residence, you will be removed from the School of Engineering and changed to the Academic Center for Exploratory Students. Residence means course completed at one of the UConn campuses and does not include Early College Experience or non-degree courses. Students will have opportunity to appeal this decision. If a student’s Cumulative GPA falls between 2.3 and 2.5, they are considered on academic probation for the School of Engineering. Students on academic probation will be reduced to a 14 credit load until the Cumulative GPA improves above 2.5. Students may stay in the School of Engineering while on academic probation with the reduced credit load.

REVISED Supplemental Dismissal Proposal - Scholastic standards

- Students will need to maintain a 2.5 Cumulative GPA (cGPA) to be in good standing in the School of Engineering.

- Students will need at least a 2.3 cGPA when they have reached a minimum of 24 credits in residence in order to continue in the School of Engineering. In residence means courses completed at one of the UConn campuses and does not include Early College Experience courses.

- Students will be supplementally dismissed from SoE when their cGPA drops below a 2.3. This does not include ECE or transfer credits.

- Students will have the opportunity to appeal the supplemental dismissal.

- Students will need to maintain above a 2.3 cGPA in every subsequent semester until graduation.
• If a student’s cGPA is between 2.3 and 2.5, they will be considered on academic probation. Students on academic probation will be reduced to a 14 credit load until the cGPA improves above a 2.5.

• Students may stay in the School of Engineering while on academic probation.

**Chemical Engineering Course & Curriculum:**

1) the curriculum changes from last semester at the retreat (roadmap attached):
   • Add ‘W’ to 4143 (Capstone II)
     • Approved at C&C meeting May 2015
   • Replace 4137W with 4139 and reduce 4139 Credits from 3 to 2
   • Eliminate 3127 (-1 credit hr.)
   • Increase number of credits in 4140 (Capstone 1) from 1 to 3
   • Rename 3128 ‘Chemical Engineering Junior Lab’
   • Rename 4139 ‘Chemical Engineering Senior Lab’

2) Enrollment in SOE is required for all 3000 and 4000 level CHEG courses (UG committee passed 4 – 0).

   - Passed by CBE faculty 13-1 (8/31/2015 via email)

3) CBE major required for design sequence and senior lab (UG committee passed 4 – 0)

   - Passed by CBE faculty 14-0 (8/31/2015 via email)
## General CHEG Curriculum

### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Credits</th>
<th>Second Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1127Q General Chemistry</td>
<td>4</td>
<td>CHEM 1128Q General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1131Q Calculus I</td>
<td>4</td>
<td>MATH 1132Q Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 1000 Orientation to Engineering</td>
<td>1</td>
<td>ENGR 1166 Foundations of Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CSE 1010C Intro to Computing</td>
<td>3</td>
<td>Arts &amp; Humanities (Content Area 1)</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1010 or 1011 Academic Writing</td>
<td>4</td>
<td>Social Sciences (Content Area 2)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16</strong></td>
<td><strong>Total Credits</strong></td>
<td><strong>17</strong></td>
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</tbody>
</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Credits</th>
<th>Second Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 1501Q Eng Physics I</td>
<td>4</td>
<td>CHEM 1502Q Eng Physics II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 2443 Organic Chemistry</td>
<td>3</td>
<td>CHEM 2446 Organic Chemistry Lab</td>
<td>1</td>
</tr>
<tr>
<td>MATH 2110Q Multivariable Calculus</td>
<td>4</td>
<td>CHEM 2444 Organic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEG 2103 Intro to Chem Engineering</td>
<td>3</td>
<td>MATH 2410Q Diff Equations</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 1104 Ethics (Content Area 1)</td>
<td>3</td>
<td>CHEG 2111 Thermodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>Free Elective</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>17</strong></td>
<td><strong>Total Credits</strong></td>
<td><strong>16</strong></td>
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### Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Credits</th>
<th>Second Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEG 3112 Thermodynamics II</td>
<td>3</td>
<td>CHEG 3124 Heat &amp; Mass Transfer</td>
<td>3</td>
</tr>
<tr>
<td>CHEG 3123 Fluid Mechanics</td>
<td>3</td>
<td>CHEG 3145 Chem Eng. Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEG 3151 Process Kinetics</td>
<td>3</td>
<td>CHEG 3128 Chem Engineering Junior Lab</td>
<td>2</td>
</tr>
<tr>
<td>Social Science (Content Area 2)</td>
<td>3</td>
<td>Engineering Requirement</td>
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</tr>
<tr>
<td>MCB/Biology/CHEM Requirement</td>
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<td>Diversity and Multiculture (Content Area 4)</td>
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<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16</strong></td>
<td><strong>Total Credits</strong></td>
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</table>

### Senior Year

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<th>Second Semester</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CHEG 4139 Chem Engineering Lab</td>
<td>2/3</td>
<td>CHEG 4139 Chem Engineering Lab</td>
<td>2/3</td>
</tr>
<tr>
<td>Free Elective</td>
<td></td>
<td></td>
<td>OR</td>
</tr>
<tr>
<td>CHEG 4140 Capstone Design 1</td>
<td>3</td>
<td>CHEG 4147 Process Dynamics &amp; Control</td>
<td>3</td>
</tr>
<tr>
<td>CHEG 4142 Unit Ops &amp; Process Simulation</td>
<td>3</td>
<td>CHEG 4143W Capstone Design 2</td>
<td>3</td>
</tr>
<tr>
<td>Diversity and Multiculture (Content Area 4)</td>
<td>3</td>
<td>CHEG Requirement</td>
<td>3</td>
</tr>
<tr>
<td>CHEG Requirement</td>
<td>3</td>
<td>Professional Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Requirement</td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td><strong>Total Credits</strong></td>
<td><strong>17</strong></td>
<td><strong>Total Credits</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

**Total 128 credits**

1. University General Education Requirements: Courses selected for Content Areas 1 & 2 must be in four different departments. One course in Content Area 4 must be an international course. One course in Content Area 4 may also satisfy a Content Area 1 or 2 requirement.

2. MCB/Biology/CHEM requirement may be satisfied by the following courses: Principles of Biology (BIOL 1107/1108 – 4 credits), Introduction to Biochemistry (MCB 2000 – 4 credits), Biochemistry (MCB 3010 – 5 credits) or Fundamentals of Microbiology (MCB 2610 – 4 credits), Physical Chemistry (CHEM 3563 – 4 credits), Analytical Chemistry (CHEM 3332 – 4 credits), Physical Chemistry 2 (CHEM 3564 – 4 credits) or others by petition.

3. CHEG Requirements are satisfied by any 2000 level chemical engineering course; Engineering Requirements are one engineering course; Professional Requirements are satisfied by any 2000 level engineering, science or math courses.
Biomedical Engineering Course & Curriculum:

The following action items have been approved by the BME C&C. All items were approved on Sept 21, 2015 C&C unless noted otherwise.

1) Propose to allow Honors and Advanced calculus courses as alternatives to regular calculus courses.

Regular Calculus Courses: MATH 1131Q, 1132Q, 2110Q, 2410Q
Honors Calculus Courses: MATH 1151Q, 1152Q, 2130Q, 2420Q
Advanced Calculus Courses: MATH 2141Q, 2142Q, 2143Q, 2144Q

Voted electronically: approved Sept 30, 2015

2) Propose to add ECE 3101 (Signals and Systems) as a pre-requisite to BME 3500

Current Description

3500. Biomedical Engineering Measurements

Four credits. Prerequisite: BME 2101; BME 3400 or ECE 3101, which may be taken concurrently; open only to Biomedical Engineering majors, others by instructor consent.


New Description

3500. Biomedical Engineering Measurements

Four credits. Prerequisite: BME 2101; Prerequisite or Corequisite: BME 3400 or ECE 3101; open only to Biomedical Engineering majors, others by instructor consent.


3) Add BME 3600, Biomechanics - presently taught as BME 3600W. The W requirement will instead be fulfilled by senior design.
4) Propose to add BME 4910W, Senior Design II – this course is currently offered as BME 4910 (non W designation). Due to the high writing demands for this course BME would like to make this a required W class for all students.

5) Add Savas Tasoglu's 3D Printed Microfluidics ME Special Topics course this Spring as a track elective for Biomechanics & Biomaterials Tracks.

6) Allow MSE 2002 as an approved Biomaterials track elective in place of MSE 2102 for double major students. BME student presently take 2102 whereas the 2002 version is taken as a required course by MSE students. This substitution will be applied for students double majoring in BMEIMSE because MSE requires that they take 2002. The catalog descriptions for the two classes are identical.

7) BME 3900 Junior Design should count as a BME elective until it becomes a required course

(Per 1 above):

Vote to make Advanced Calc and Honors Calc sequences count for regular Calc Sequence for all Catalog Years

MATH 1131Q (Regular Calc II)
Limits, continuity, differentiation, antidifferentiation, definite integral, with applications to the physical sciences and engineering sciences. Suitable for students with some prior calculus experience. Substitutes for MATH 1120, 1126 or 1151 as a requirement.

MATH 1151Q (Honors Calc)
The subject matter of MATH 1131 in greater depth, with emphasis on the underlying mathematical concepts. May be used in place of MATH 1131 to fulfill any requirement satisfied by MATH 1131.

MATH 2141Q (Advanced Calc)
A rigorous treatment of the mathematics underlying the main results of one-variable calculus. Intended for students with strong interest and ability in mathematics who are already familiar with the computational aspects of basic calculus. May be used in place of MATH 1131 or 1151 to fulfill any requirement satisfied by MATH 1131 or 1151. May be taken for honors credit but open to any qualified student.

MATH 1132Q (Reg Calc II)
Transcendental functions, formal integration, polar coordinates, infinite sequences and series, vector algebra and geometry, with applications to the physical sciences and engineering. Substitutes for MATH 1122 or 121 as a requirement.

MATH 1152Q (Honors Calc II)
The subject matter of MATH 1132 in greater depth, with emphasis on the underlying mathematical concepts. May be used in place of MATH 1132 to fulfill any requirement satisfied by MATH 1132.

MATH 2142Q (Advanced Calc II)
A rigorous treatment of the mathematics underlying the main results of one-variable calculus. Intended for students with strong interest and ability in mathematics who are already familiar with the computational aspects of basic calculus. MATH 2142Q may be used in place of MATH 1132, 1152 or 2710 to fulfill any requirement satisfied by MATH 1132, 1152 or 2710. May be taken for honors credit but open to any qualified student.

MATH 2110Q (Reg Multivariable Calc)
Two- and three-dimensional vector algebra, calculus of functions of several variables, vector differential calculus, line and surface integrals.

MATH 2130Q (Honors Multivariable Calc)
(Honors Course) The subject matter of MATH 2110 in greater depth, with emphasis on the underlying mathematical concepts. May be used in place of MATH 2110 to fulfill any requirement satisfied by MATH 2110.

MATH 2143Q (Advanced Calc III)
A rigorous treatment of more advanced topics, including vector spaces and their application to multivariable calculus and first-order, second-order and systems of differential equations. MATH 2143 may be used in place of MATH 2110 to fulfill any requirement satisfied by MATH 2110. May be taken for honors credit but open to any qualified student.

MATH 2410Q (Reg Elementary Differential Equations)
Introduction to ordinary differential equations and their applications, linear differential equations, systems of first order linear equations, numerical methods.

MATH 2420Q (Honors Differential Equations)
The subject matter of MATH 2410 in greater depth, with emphasis on the underlying mathematical concepts. MATH 2420 satisfies any requirement met by MATH 2410, and provides superior preparation for prospective mathematics, science, and engineering majors.

MATH 2144Q (Advanced Calc IV)
A rigorous treatment of more advanced topics, including vector spaces and their application to multivariable calculus and first-order, second-order and systems of differential equations. MATH 2144 may be used in place of MATH 2410, MATH 2420 or MATH 2210 to fulfill any requirement satisfied by MATH 2410, MATH 2420 or MATH 2210. May be taken for honors credit but open to any qualified student.

Create a new course (per 3 above):

**BME 3600: BIOMECHANICS (DRAFT)**

Fall 2015

Dr. David M. Pierce  
UTEB 376, 860-486-4109  
Email: dmpierce@engr.uconn.edu

**Lecture/Problem Sessions:** Tu, Th 11:00 AM – 12:15 PM, ARJ 105

**Teaching Assistant (Lecture):** Franz Maier  
Email: franz.maier@uconn.edu
Office: BRON 201  
Office Hours: M, W 9:00 – 11:00 AM

**Lab Instructor:** Dr. Krystyna Gielo-Perczak  
Email: krystyna.gielo-perczak@engr.uconn.edu
Office: BRON 204  
Office Hours: M, W 1:00 – 2:00 PM

**Teaching Assistant (Lab):** Anna Roto  
Email: anna.roto@uconn.edu

**Teaching Assistant (Lab):** Jessica Hockla  
Email: jessica.hockla@uconn.edu

**Text (required):**
1. *An Introduction to Biomechanics: Solids and Fluids, Analysis and Design*  
   Jay D. Humphrey and Sherry L. Delange, Springer-Verlag, 2004

**Reference Texts** (optional, good for additional help):
   Y.C. Fung, Springer-Verlag, 1993
2. *Cardiovascular Solid Mechanics*  
   J.D. Humphrey, Springer-Verlag, 2002
3. *Introduction to Continuum Mechanics, 4th ed.*  
4. *Nonlinear Solid Mechanics: A Continuum Approach for Engineering*  
   G.A. Holzapfel, Wiley, 2000
**Course Objectives:** This course focuses on the application of solid mechanics to describe the mechanical behavior of biological tissues. The course will introduce the tools necessary to model tissues, including the essential mathematics, kinematics of deformation and motion, stress, constitutive relations. The basic biomechanics principles will be taught and reinforced by identifying, formulating and solving problems related to, e.g., bone, tendon, cardiac and vascular tissues. Experimental methods for probing the mechanical responses of biological tissues will also be introduced. At the completion of the course, you should be able to: (1) analyze the forces at a skeletal joint for various static human activities; (2) recall the general characteristics, material properties, and appropriate constitutive models for tissues studied; (3) analyze the stresses and strains in biological tissues, given the loading conditions and material properties; and, (4) identify relationships between structure and function in tissues and the implications/importance of these relationships.

**Class Schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Reading</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 01</td>
<td>Tu Introduction to biomechanics, Index notation, Vectors</td>
<td>Ch 1.1-1.3, 1.7</td>
<td></td>
</tr>
<tr>
<td>Sep 03</td>
<td>Th Vectors, Matrices, Statics</td>
<td>Handout 1 Appendix 6</td>
<td>HW1 and Project assigned</td>
</tr>
<tr>
<td>Sep 08</td>
<td>Tu Statics</td>
<td>Handout 2</td>
<td></td>
</tr>
<tr>
<td>Sep 10</td>
<td>Th Statics, Moments of area</td>
<td>Appendix 3, 4</td>
<td>HW1 due, HW2 assigned</td>
</tr>
<tr>
<td>Sep 15</td>
<td>Tu Stress: Definitions</td>
<td>Ch 2.1-2.2</td>
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</tr>
<tr>
<td>Sep 17</td>
<td>Th Stress: Transformations</td>
<td>Ch 2.3</td>
<td>HW2 due, HW3 assigned</td>
</tr>
<tr>
<td>Sep 22</td>
<td>Tu Stress: Principal values</td>
<td>Ch 2.4</td>
<td></td>
</tr>
<tr>
<td>Sep 24</td>
<td>Th Strain: Definitions</td>
<td>Ch 2.5</td>
<td>HW3 due, HW4 assigned</td>
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<tr>
<td>Sep 29</td>
<td>Tu Strain: Transformations, Gauges</td>
<td>Ch 2.5</td>
<td></td>
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<tr>
<td>Oct 01</td>
<td>Th Review, Examples</td>
<td></td>
<td>HW4 due</td>
</tr>
<tr>
<td>Oct 06</td>
<td>Tu Exam 1</td>
<td></td>
<td></td>
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<tr>
<td>Oct 08</td>
<td>Th Constitutive behavior</td>
<td>Ch 2.6</td>
<td>HW5 assigned</td>
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<tr>
<td>Oct 13</td>
<td>Tu Mechanical properties of bone, Axially loaded rods</td>
<td>Ch 2.7, 3.1</td>
<td>JP for Project selected</td>
</tr>
<tr>
<td>Oct 15</td>
<td>Th Inflation of thin-walled tube</td>
<td>Ch 3.3-3.4</td>
<td>HW5 due, HW6 assigned</td>
</tr>
<tr>
<td>Oct 20</td>
<td>Tu Inflation of thin-walled tube</td>
<td>Ch 3.4</td>
<td></td>
</tr>
<tr>
<td>Oct 22</td>
<td>Th Pressurization of spherical structure, Uniaxial extension</td>
<td>Ch 3.5, Ch 4.1</td>
<td>HW6 due, HW7 assigned</td>
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<tr>
<td>Oct 27</td>
<td>Tu Uniaxial extension, Torsion of a rod</td>
<td>Ch 4.1-4.2</td>
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<tr>
<td>Oct 29</td>
<td>Th Beam bending: Shear forces and bending moments</td>
<td>Ch 5.1</td>
<td>HW7 due, HW8 assigned</td>
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<tr>
<td>Nov 03</td>
<td>Tu Beam bending: Normal stresses</td>
<td>Ch 5.1-5.2.2</td>
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<tr>
<td>Nov 05</td>
<td>Th Review, Examples</td>
<td></td>
<td>HW8 due</td>
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<td>Nov 10</td>
<td>Tu Exam 2</td>
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</tr>
<tr>
<td>Nov 12</td>
<td>Th Beam bending: Shear stresses, Deformations</td>
<td>Ch 5.2.2-5. 3</td>
<td>HW9 assigned</td>
</tr>
<tr>
<td>Nov 17</td>
<td>Tu Beam bending: Deformations, Nonlinearities: Introduction</td>
<td>Ch 5.3, 6.1</td>
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<tr>
<td>Nov 19</td>
<td>Th Nonlinearities: Kinematics, Pseudoelasticity</td>
<td>Ch 6.1-6.2</td>
<td>HW9 due, HW10 assigned</td>
</tr>
<tr>
<td>Nov 24</td>
<td>Tu Thanksgiving recess; No class.</td>
<td></td>
<td></td>
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<tr>
<td>Nov 26</td>
<td>Th Thanksgiving recess; No class.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec 01</td>
<td>Tu Nonlinearities: Kinematics, Stress</td>
<td></td>
<td>HW10 and Project due, HW11 assigned</td>
</tr>
</tbody>
</table>
Violation of Academic Integrity: All work (exams/homeworks/projects) submitted by students must be their own original effort, copying of solutions, etc. from any source constitutes plagiarism and is not permitted. Furthermore, students should not try to obtain exams from former Biomechanics students, nor will students disclose exam questions to other students who have not yet taken an exam or to future students of the class. A violation of this policy will result in a minimum penalty of an F for the exam in question, and a maximum penalty of dismissal and an F for the class. Violations of Academic Integrity will be reported to the Academic Dean, in which case additional penalties may result. Community Standards has been entrusted with the responsibility of managing Responsibilities of Community Life: The Student Code (http://community.uconn.edu/the-student-code-pdf).

Lecture: The use of mobile/smart phones is not permitted during lectures (cf. Tindell and Bohlander, 2012; Duncan et al., 2012). For example, a recent study demonstrated that students who regularly used cell phones in class showed an average negative grade difference of 0.36 ± 0.08 on a four-point scale (Duncan et al., 2012). Students using their cell phones during class must leave class for the rest of the day. The use of tablets and laptops during lectures is strongly discouraged (cf. Sana et al., 2013; Mueller and Oppenheimer, 2014). For more information these articles can be downloaded from the course’s HuskyCT website (http://huskyct.uconn.edu).

Reading: It is important to read the assigned material before class, since much of the class time will be spent reviewing materials and working example problems.

Homework: Homework assignment and due dates are listed on the class schedule below. Homeworks are due BEFORE class starts on the due date, i.e., on or before 10:59 AM of the due date. Late homework will not be accepted. The best 10 homework grades will be scored to calculate the final grade for the homework portion of the class. Homework solutions will be available on HuskyCT on the assignment due date. Work should be well organized. Show all of your work, including algebra. All writing and diagrams should be clear and legible. Solve problems in symbolic form until it is time to obtain a numerical result. Staple all pages with the problems in order. Clearly delineate the “answer” by some method, e.g., a box.

In-Class Exams: Each in-class exam will be approximately 75 minutes in length. Make-up exams will not be given except in the case of documented medical emergency. The use of mobile/smart phones and tables/laptops is not permitted during exams. Students may bring a single 8.5”x11” sheet of office paper with handwritten notes and equations (no copies of complete solutions) on both sides per exam and cumulative (one sheet to Exam 1, two sheets to Exam 2 and three sheets to Final Exam).

Final Exam: The final exam will be approximately 2 hours in length. Students are required to be available for their exam during that time. Students must visit the Dean of Students Office (DOS) if they cannot make their exam. The DOS will give the student his or her instructions thereafter. Please note: vacations, previously purchased tickets or reservations, weddings (unless part of the wedding party), and other large or small scale social events, are not viable excuses for missing a final exam. When there are unavoidable circumstances, your finals may be rescheduled, e.g., medical procedures. Please be prepared to provide documentation about the event. Please contact the Dean of Students office with any questions.

Project (BME honor students, or extra credit for non-honors students): Details of the project are provided in a handout titled “Report Guidelines.” In the case of non-honors students the project adds the weight of two home works to the total homework score.

Lab experiments and reports: Lab experiments will be supervised by Dr. Krystyna Gielo-Perczak. There are a total of five regular reports (5-6 pages) and two writing intensive reports (10-15 pages).

Syllabus: The syllabus of this course will be evolving throughout the semester. The latest version can be downloaded from the course’s HuskyCT website (http://huskyct.uconn.edu).

Grading: The grading scheme provided here is a guideline for distributing your effort and for ESTIMATING a final grade. All assignments and assessments listed above will receive a numeric score. Weighting of these numeric scores, completed according to this syllabus, determines a numeric version of the final grade. The raw numeric scores will be converted to
letter grades based on a formula accounting for the distribution in performance of the entire class. Determination of final letter grades is at the discretion of the teaching team. Letter grades will be provided for Exams 1 and 2 to provide intermediate feedback on performance.

<table>
<thead>
<tr>
<th>Grading* for BME Students:</th>
<th>Grading* for BME Honor Students:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeworks</td>
<td>Homework:</td>
</tr>
<tr>
<td>10 %</td>
<td>10 %</td>
</tr>
<tr>
<td>Midterm Exams (2)</td>
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<td>Labs</td>
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<td>Project Report</td>
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<td>Extra Credit</td>
<td>10 %</td>
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<tr>
<td>Final Exam</td>
<td>Final Exam:</td>
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<td>25 %</td>
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</table>

*Either: 1. Failing the lecture portion of the course (complete grade without including the Labs); or, 2. failing the Final Exam and one Midterm Exam, will result in an automatic F for the entire course regardless of performance on the remaining course materials.

**Tutoring/learning Resource Centers:** (1) Engineering Tutoring Center located in the Engineering II building, Room 325, on a drop-in basis, during the center's published hours. For more information please contact Whitney Losapio (whitney@engr.uconn.edu, 860-486-0512) or Laura Volpe (lvolpe@engr.uconn.edu, 860-486-7113); (2) Supplemental Instruction (SI) is a program targeted at traditionally difficult courses which provides regularly scheduled, peer-led learning sessions. For more information go to, [http://achieve.uconn.edu/si/](http://achieve.uconn.edu/si/); (3) Tutoring at UConn. UConn and its schools and colleges coordinate many types of tutoring for students. For more information go to, [http://achieve.uconn.edu/tutoring-at-uconn/](http://achieve.uconn.edu/tutoring-at-uconn/). For an overview go to, [http://advising.uconn.edu/](http://advising.uconn.edu/).

**Students with Disabilities:** If you have a disability for which you wish to request academic accommodations and have not contacted the Center for Students with Disabilities (CSD), please do so as soon as possible. The CSD engages in an interactive process with each student and reviews requests for accommodations on an individualized, case-by-case basis. The CSD collaborates with students and their faculty to coordinate approved accommodations and services. The CSD is located in Wilbur Cross, Room 204 and can be reached at (860) 486-2020 or at csd@uconn.edu. Detailed information regarding the process to request accommodations is available at [http://www.csd.uconn.edu](http://www.csd.uconn.edu).

**Policy Against Discrimination, Harassment and Inappropriate Romantic Relationships:** The University is committed to maintaining an environment free of discrimination or discriminatory harassment directed toward any person or group within its community – students, employees, or visitors. Academic and professional excellence can flourish only when each member of our community is assured an atmosphere of mutual respect. All members of the University community are responsible for the maintenance of an academic and work environment in which people are free to learn and work without fear of discrimination or discriminatory harassment. In addition, inappropriate Romantic relationships can undermine the University’s mission when those in positions of authority abuse or appear to abuse their authority. To that end, and in accordance with federal and state law, the University prohibits discrimination and discriminatory harassment, as well as inappropriate Romantic relationships, and such behavior will be met with appropriate disciplinary action, up to and including dismissal from the University. More information is available at [http://policy.uconn.edu/?p=2884](http://policy.uconn.edu/?p=2884).

**Sexual Assault Reporting Policy:** To protect the campus community, all non-confidential University employees (including faculty) are required to report assaults they witness or are told about to the Office of Diversity & Equity under the Sexual Assault Response Policy. The University takes all reports with the utmost seriousness. Please be aware that while the information you provide will remain private, it will not be confidential and will be shared with University officials who can help. More information is available at [http://sexualviolence.uconn.edu/](http://sexualviolence.uconn.edu/).

**Copyright Information:** My lectures, notes, handouts, and displays are protected by state common law and federal copyright law. They are my own original expression and I’ve recorded them prior or during my lecture in order to ensure that I obtain copyright protection. Students are authorized to take notes in my class; however, this authorization extends only to making one set of notes for your own personal use and no other use. I will inform you as to whether you are authorized to record my lectures at the beginning of each semester. If you are so authorized to record my lectures, you may not copy this recording or any other material, provide copies of either to anyone else, or make a commercial use of them without prior permission from me.
New course - BME 4910W - Senior Design II

CLASS TIME
Friday, 1:00 to 5:00pm in CAST 118. In addition to working on projects during this period, each team meets individually with the instructor for 30 minutes for the weekly meeting, which is by arrangement with the team’s faculty advisor and can occur outside of this lab time. Meeting locations are also to be arranged with the team faculty advisor.

COURSE DESCRIPTION
Design of a device, circuit, system, process or algorithm based on work carried out in BME 4900. Students implement their design by completing a working model of the final product, where prototype testing of the design may require modification(s) in order to meet specifications. Written progress reports, laboratory notebooks, laboratory safety and bench organization, a final report, and oral presentations are required. In BME 4910, each student:

• Works on a team and implements a team-based approach to design and prototype development,
• Constructs and tests a prototype using modular components as appropriate,
• Conducts system integration and testing,
• Assembles final product,
• Field test the device,
• Present an oral team report during a dedicated lecture and on Senior Design Day, and
• Delivers working project to their client.

COURSE PRINCIPLES
Students must be prepared for engineering practice through the curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.

COURSE OBJECTIVES
This course will continue the implementation of a variety of design topics including: design of a device, circuit, system, process, or algorithm. It will continue to focus on aspects of the overall engineering design process including: working on teams, project planning and scheduling (e.g., timelines), technical report writing, oral presentations, ethics in design, safety, liability, impact of economic constraints, environmental considerations, manufacturing and marketing.

Upon completion of this course, most students will have:

• Created (i.e., layout and fabricate) a Printed Circuit (PC) board using a protocol such as Multisim and soldering circuit elements to PC board
• Used Multisim to design, analyze, and troubleshoot an electric circuit
• Written a LabVIEW interface for any type of signal or display and incorporate the use of various filters to change waveform characteristics in the LabVIEW interface
• Programmed and used a microprocessor or microcontroller
• Used Autodesk Inventor or SolidWorks to analyze and troubleshoot a mechanical system
• Implemented safety and environmental and marketing considerations in the design process

In this course, each student team will:

• Create and maintain an internet website,
• Record work completed in a laboratory notebook following industry practices,
• Maintain a detailed time-line for the project, possibly using Microsoft Project,
• Give a presentation on your project using Microsoft PowerPoint,
• Demonstrate an ability to design and conduct experiments, analyze and interpret data,
• Demonstrate an ability to design a system, component, or process to meet desired needs,
• Recognize the need for, and an ability to engage in life-long leaning experience by just in time learning,
• Construct and test a prototype project using modular components,
• Use skills, where appropriate, such as PC board layout and fabrication, manufacturing (packaging), mechanical design and trouble shooting,
• Conduct system integration and testing,
• Use appropriate manufacturing/construction technologies,
• Assemble final product,
• Field-test the project,
• Conduct failure analysis on product,
• Write final project report and user’s manual,
• Engage in safe laboratory practice.

ATTENDANCE
Attendance in the Friday 1:00 to 5:00pm class is mandatory! Each student is expected to be in lab for the entire four hour period and, during this time, students should be working on their project and not writing their weekly report, constructing their weekly presentation, or writing their final report. PLEASE NOTE that missing more than two team meetings or lab sessions can result in a failing grade for this course. It is imperative that a student informs their faculty advisor in advance if they cannot attend the Friday lab due to an interview, extenuating circumstance, etc.

LAB BENCH
Each Team is assigned a workbench in CAST 118 (or another designated location) for the duration of the semester. You are REQUIRED to keep your workbench clean and organized and to follow the rules of operation. Any student who violates the lab area of another student will have their lab privileges suspended for 1 week, with the next infraction involving a suspension of 3 weeks, then 6 weeks, and then 12 weeks.
NOTEBOOKS
Continuing the practice from BME 4900, each student continues to maintain a bound research notebook in which all work is recorded. Each page is dated and signed at the bottom of each page. You must bring your notebook to each team meeting and lab session as it is graded weekly.

WEB SITE
Continuing the practice from BME 4900, each student places a weekly two-page progress report (single spaced and in PDF format) on their WEB site before the team meeting. This report is graded weekly. Each week’s report must contain at least one photograph of your part of the project. The photographs should provide a visual history of your project through the semester. WEB Site must conform to WEB Site Instructions provided during BME 4900. One student from the team will present a team report highlighting the entire team's performance using PowerPoint, which will also be posted on their website. Updates to timelines may also be posted, if needed.

COURSE MATERIAL


Goldberg JR, *Capstone Design Courses, Part II: Preparing Biomedical Engineers for the Real World*, Morgan & Claypool Publishers, San Rafael, CA, 2012 (http://www.morganclaypool.com/toc/bme/1/1/- You must be inside the UConn network to access the book)


Software: All software protocols are available on the computers in the Engineering Learning Centers or for use on your personal computer by accessing the UConn vPC at http://vpc.uconn.edu.

Website: Course Material will be posted at: http://www.bme.uconn.edu/sendes/Handouts/index.htm.
GRADING CONTENT

Attendance: **MANDATORY!!**

**Notebooks:** Each student maintains a bound laboratory notebook in which all work is recorded. Each page should be dated and initialed at the bottom of the page.

**Grading Scheme:** The following scheme will be used to determine a final grade:

- Weekly Reports, Presentations, and Notebooks: 25%
- Team Evaluations by Each Team Member (two minimum): 5%
- User's Manual: 10%
- Final Report: 10%
- Final Report Oral Presentation: 10%
- Project Abstract for Demo Day Booklet: 5%
- Client Grade: 10%
- Prototype Completion and Functionality: 25%

**100%**

**NOTE:**
- No grade will be given until the client signs off, including the Liability Form, and accepts the project. This should be done no later than May 1, 2016.
- Students will receive a final grade of F unless the project is working as specified and all deliverables are submitted by the end of the semester.
- Any student using the senior design computers to view inappropriate Web material will lose their lab privileges for the rest of the semester.

**Criteria for W-designation**

The Senior Design II (BME 4910) course includes a formal report writing that students must pass in order to pass the course. This report plays a critical role in the student’s learning process by teaching them how to develop ideas, test hypothesis, organize data, and present results. The student report must meet the following general requirements:

- The report must follow the general format of a peer-reviewed BME journal.
- The report must be typed (double spaced), paginated, and written in the third person.
- The report should be a minimum of 16 pages.
- All necessary tables and figures must be included, and each should be numbered and have a caption.
- Decimal precision should be reasonable, (1-3 decimal places) and uniform throughout the report.
- Any variables, parameters, or constants used in equations must be defined.
- All physical quantities included in the report should have the proper units where applicable.
- Reports should have references cited in an appropriate manner. The UCONN library website has information in the tutorial section that covers both how to cite and evaluate a source ([www.lib.uconn.edu](http://www.lib.uconn.edu)).
• Reports will be graded on grammar and style, organization, presentation, and technical merit before being handed back to students to revise. The report will then be re-submitted for a re-grade.

Report organization

I. Title Page- (1 page)

This page lists the title of the report, names and affiliations of all students on the design team, and names of faculty advisor(s) and client with their affiliations also. The name of the primary author of the report should be clearly indicated.

II. Abstract and Introduction- (1-3 pages)

This section should contain a literature review of the project idea, problem statement (i.e. the problem being solved or addressed) and objectives, and clearly state the novelty in the project.

III. Methodology- (3-4 pages)

This should describe the methods used. This section must be written in paragraph format and in the author’s own words. Additionally, this section should include a list of all equipment used (make and model, manufacturer, and software version if applicable). The materials used can be presented in a list. A drawing or picture of the test/experimental setup, complete with labels should also be included.

IV. Results- (5-7 pages)

The results section should include all experimental data and calculated results. This includes all equations numbered consecutively. If you have a large set of data, you should only list the calculated results here and put the raw data in the appendix. You should present all results in tables and graphs as appropriate. Mathematical error analysis is also included here.

V. Discussion- (4-6 pages)

The discussion section should explain the results observed in terms of everything that is known about the project. If the expected results were not observed, provide an explanation as to why the results were different. Sources of error should be fully examined and explained in this section.

VI. References- (Minimum of 1 page)

List all cited materials and references to others people’s work in this section.

VII. Appendix- (Page length depends on amount of information)

This section may be used to show the raw data, intermediate steps used to derive equations or other important supplementary information that was too cumbersome to put in the body of the report. If you use the appendix be sure to reference it in the body of your report as required.
We ask for your input on the success of the project that is being built for you two times during the semester. It is expected that any changes requested by you will be incorporated after discussion between Team and the Course Instructor. Team Reports are provided weekly in the team website.

As we indicated earlier, the project will undergo changes as we proceed with the construction and we will ask for your input on current progress during the spring semester. Your input at these help the team create a project according to your needs.

The project will be completed in April 2016 and will be delivered to you for testing in April 2016. Update the project each week according to your input. It is very important that all testing be completed by the end of April 2016. Senior Design Day will be in Gampel Pavilion (Friday, May 1st) and your project will be demonstrated during that afternoon.

Check one of the items below and describe the tasks that need to be completed before your grade the project.

Project Exceeds Expectations
Project Meets Expectations
Project Does Not Meet Expectations
Tasks that need to be completed:

______________________________

Client or Client Contact        Date
The University of Connecticut Biomedical Program Senior Design Lab is happy to present you this project. This device designed and built with your input by three or more of our students is presented to you without warranties of any kind, and the faculty, staff and the student designer(s) specifically disclaim any liability for any incidental or consequential damages arising from the use of the project.

As part of the student’s requirements for completion of this project, an inspection of this project by the Senior Design Lab faculty and staff with respect to its durability and safety was performed. The device being presented to you has passed this inspection.

You, the person accepting this device, take full responsibility of the use, care, and operation of this device. The Senior Design Lab takes no responsibility for the device once it has been presented to you and installed and therefore removes itself from any liability or responsibility caused by any failure or miss-use of this device for any reason including operation of the device in situations where common sense dictates it not be used.

Repairs to this device are also not the responsibility of the BME Senior Design Lab. However, if the device fails, we may repair it as a future team project.

If these conditions set forth are unsatisfactory to the intended user, the device will be withdrawn before presentation and installation.

Project Name:

_________________________________ _________________
Senior Design Lab Representative Date

_________________________________________________________________
Client or Client Contact Date

_________________________________________________________________
Relation of Client Contact to Client
WEEKLY TEAM MEETINGS – EXPECTATIONS

During the semester design teams will meet with your faculty advisor and the TA to discuss the project’s progress. The team meetings for BME 4910 start immediately in Week 2 and occur all semester. The meetings will occur every week and will last between 15-30 minutes.

Teams will be expected to prepare and deliver a PowerPoint presentation outlining the following:

- A brief overview of the project (Please include a drawing or image explaining what the final design will look like.)
- Completed work
- Project Review
  - Discuss the successes and hang-ups of the project, and how any issues will affect the project
- Future work
  - Discuss the tasks to be completed in the next week
  - Make clear who is responsible for each task
- Budget Update
- Hours Worked by each team member

The second half of the meeting will be with the TA to review your laboratory notebooks.

Grades, out of a possible 10 points, for the weekly meetings will be assigned as follows:

Team Grade (5 points):
Overall progress of the project based on teamwork will be graded between 0 and 5 points.

Individual Grade (2 points):
2 – Individual has met or exceeded weekly goal.
1 – Individual has partly met weekly goal.
0 – Individual has not completed weekly goal.

Lab notebook (2 points):
2 – Notebook is signed and dated on each page. Notes are thorough and clearly written. Print outs are neatly attached to pages with tape or staples.
1 – Notebook is lacking signatures and dates or notes are incomplete or unclear.
0 – Notebook was not updated or not brought to meeting.

Lab Bench Organization and Safety (1 point):
1 – Laboratory Bench is well organized and promotes laboratory safety
0 – No organization or attempts at laboratory safety
Welcome to the Senior Design Lab in Castleman 118. This Lab is your exclusive “club” and you are free to use it as you like for the completion of your projects. However, certain guidelines of cleanliness and professional etiquette will be followed.

Laboratory Access
1) The lab is for the exclusive use of students enrolled in BME 4900 and BME 4910. NO ONE else may use the lab without permission.
2) The door must remain locked at all times. Please do not prop the door for any reason.

Lab Cleanliness
1) The rooms must be kept clean and free of papers, books, and other items.
2) The computer area on each lab bench must also be kept clean.
3) Do not allow the garbage can to pile up to the point where garbage has to lean against the wall – be proactive in keeping the lab clean.
4) ABSOLUTELY no eating or drinking is permitted in the lab
5) The tool cabinet is to be kept organized. ALL TOOLS MUST BE RETURNED AFTER USE. No tools will be allowed to remain at team benches. This is to ensure that everyone has access to all available tools.

Bench Issues
The bench assigned to your team is your private area. Your team members are the only ones allowed to use this area. You should expect that whatever you leave on this bench will remain undisturbed, especially if you are in the midst of a test or build. With this in mind:

1) Do not intrude upon another lab-member’s bench. If you must, seek permission of the lab-member.
2) Do not remove anything from another person’s bench.
3) Never use another lab-member’s electronic equipment without their expressed permission.
4) Never disturb another project for any reason.
5) Keep your bench in a neat and orderly manner.
6) No soldering is permitted on the wooden benches. Please use the soldering benches in CAST 118, the lab for soldering.

Computer Usage
1) Lab computers may be used for work relating to your projects only.
2) Lab computers may not be used to illegally download music, movies, applications, etc. All internet activity is monitored in university labs.
3) No software may be installed without instructor permission. Please fill out the BME Software Request Form (found on the Senior Design website) if you need an application that is not installed. Requests are subject to approval.
4) Students should access “Work Appropriate” websites. Do not view any content that would be considered “Not Safe for Work” (i.e. Pornographic, Violent, Drug, or other offensive content).
5) Do not move any computers, mice, keyboards, monitors, or other peripherals without permission.

Lab equipment and general issues
1) Do not use equipment for reasons other than its intended use.
2) Do not remove any items from the lab.
3) Please be considerate to the environment and print only the most important documents. The lab printer is for Senior Design printing only. Do not print documents for other courses.
4) Please recycle all paper and cardboard in the blue recycling bin.
5) Turn off the lights if you are the last person in the room.
ME 3295/5895-3D Printed Microfluidics

Instructor: Prof. Savas Tasoglu: \(!m\text{JW}!9.\$QQJ\) ru
Office Hours & Location: Tuesdays 4-5 pm or by appointment, 372 UTEB
Please use: \{instead of my uconn email box\)

Lectures: CHM T309, Tu and Th 9:30AM- 10:45 AM
Course Reader:
- (OPTIONAL) Introduction to BioMEMS, A. Folch, 2012
- Lecture notes will be provided

The course is an introduction to the physicochemical dynamics associated with fluid flow in microscale devices and the 3D printing technologies for fundamental BioMEMS design for graduate students and undergraduate students. We will study transport phenomena relevant to micro/nano-scale fluid flow. Throughout the course, we will place an emphasis on bioanalytical microfluidic system applications. Successful completion of the course will prepare students to design microfluidic engineering solutions by utilizing 3D printing principles, as well as critically assess academic and industrial developments in these areas.

Topics include: low Reynolds number fluid mechanics, diffusion phenomena, microfabrication via 3D printing, advantages and limitations of different 3D printing technologies. Applications focus on Biological (or Biomedical) Micro-Electro-Mechanical Systems (BioMEMS) including point-of-care health diagnostics. We will (i) introduce the need for miniaturized systems in biology and medicine, (ii) introduce the basics of microscale manipulation of cells and biological agents employing the fundamentals of microscale behaviors of fluids and mechanical systems, and (iii) expose the students to central design considerations and emerging applications of BioMEMS technologies in biology and medicine.

Specific goals include:
1. To introduce students to the governing principles of microfluidic regimes and fundamental BioMEMS design and 3D printing concepts.
2. To provide students with an understanding of scaling laws that govern performance of microfluidics.
3. To provide students with knowledge to lead a detailed investigation of applications that do and do not benefit from miniaturization.
4. Explain current and emerging 3D printing applications in a variety of industries including microfluidic chip fabrication
5. Describe the advantages and limitations of each 3D printing technology
6. Evaluate real-life scenarios and recommend the appropriate use of 3D printing technology
7. Identify opportunities to apply 3D printing technology for time and cost savings in microfluidic chip design and fabrication
8. Discuss the economic implications of 3D printing including its impact on biomedical startup businesses and supply chains
9. To prepare students for critical assessment of literature reports and conference presentations regarding advances in the topical areas of microfluidics and BioMEMS.
10. To equip students with fundamental knowledge of physicochemical phenomena for industrial positions in biotech, medical diagnostics & device design.
Attendance: While attendance is not required, out of a commitment to learning & professional courtesy it is expected. A portion of your grade is based on participation and discussion.

Grading & collaboration* (not finalized yet): A weighted average grade will be calculated as follows:

- Problem sets 45%
- Midterm 25%
- Final exam 25%
- Participation 5% (Surveys, In-class exercises & participation)

Note we do not curve grades in this course. It is theoretically possible for everyone in the class to get an "A" (or an "F"). Your performance depends on how well you donot on how everyone else in the class does. It is therefore in your best interest to help your classmates in every legal way possible.

Teaching commitment: You can expect the teaching team to be courteous, respectful, and punctual; be well organized and prepared for lecture and other class activities, answer questions carefully and clearly in a non-negative fashion, be available during office hours or notify you beforehand if they are unable to keep office hours, and grade uniformly and consistently according to the posted guidelines.

Interim feedback surveys: We would like to make the course the best possible learning experience for you. To accomplish this goal, we need your feedback prior to the final course evaluation. Consequently, we will take periodic surveys of your suggestions for improvement and comments on effective components. Please provide detailed, candid feedback, as the course improvement relies critically on your input!

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Civil & Environmental Engineering Course &Curriculum:

Department of Civil and Environmental Engineering

C&C Proposal:

Item 1

Students taking structural design courses (CE 3630, Steel Structure Design and CE 3640, Reinforced Concrete structure Design) without structural analysis background, perform poorly in these courses. STAM Faculty members unanimously requested to add CE 3610 (basic structural analysis) as the pre-requisite for structural design courses.

Propose to require CE 3610 (Basic Structural analysis) as Civil Engineering core courses for Structural area. CE 3630 or CE 3640 will no longer be required courses for CE majors; this requirement will be replaced with an additional professional requirement.

We have also determined that it is sufficient for students to take CE 3110 Mechanics of Materials concurrently with CE 3610. This will allow more flexibility for students to schedule this sequence of courses.

Action: The catalog description for CE 3630, CE 3640, and CE 3610 needs to be modified as follow.

3610. Basic Structural Analysis

Three credits. Prerequisite or Corequisite: CE 3110; enrollment in the School of Engineering.
Analysis of statistically determinate structures; influence lines; deflection of trusses, beams, and frames; introduction to indeterminate analysis using consistent deformation and moment distribution; computer programming.

3630. Design of Steel Structures

Four credits. Prerequisite: CE 3410 3610; enrollment in the School of Engineering.

Steel material and structural shapes; LRFD and ASD design philosophies; design of steel members for tension, compression, bending, and combined effects of axial forces and bending moments; design of simple connections; design project.

3640. Design of Reinforced Concrete Structures

Four credits. Prerequisite: CE 3410 3610; enrollment in the School of Engineering.

Loads; design philosophies, current design codes to analyze and design reinforced concrete beams, columns, slabs, foundations for flexure, shear, axial loads and torsion; serviceability considerations; applications to buildings, design project.

Note: to accommodate students with their course selection schedule, we plan to offer CE 3610 in fall and encourage Civil Engineering students to take ENVE 3120 in spring of their junior year.
# Updated Civil Engineering Curriculum 2016-2017

## NORMAL SEMESTER BY SEMESTER COURSE SEQUENCE (128 credits)

### FIRST YEAR

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<th>Course Title</th>
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<td><strong>First Semester</strong></td>
<td>CHEM 1127Q or 1147Q</td>
<td>General Chemistry</td>
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<td></td>
<td>CHEM 1128Q or 1148Q</td>
<td>General Chemistry</td>
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<td>MATH 1131Q</td>
<td>Calculus I</td>
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<td>MATH 1132Q</td>
<td>Calculus II</td>
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<td>ENGR 1000</td>
<td>Orientation to Engineering</td>
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<td>CSE 1010</td>
<td>Intro to Computing for Engineers</td>
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<td>ENGL 1010 or ENGL 1011</td>
<td>Seminar in Academic Writing or Sem. in Writing thru Literature</td>
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### Second Semester

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### SECOND YEAR

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<td>MATH 2110Q</td>
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<td>CE 2110</td>
<td>Applied Mechanics I</td>
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<td>CE 2410</td>
<td>Intro to Geospatial Anal. &amp; Meas.</td>
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</table>

### Second Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 1502Q</td>
<td>Physics for Engineers II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2410Q</td>
<td>Elem. Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>CE 3110</td>
<td>Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td>CE 2710</td>
<td>Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 1104</td>
<td>Philosophy &amp; Ethics (CA 1)</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
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</table>

### THIRD YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td>CE 2251 / ENVE 2330</td>
<td>Probability and Statistics in CEE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CE / ENVE 2310</td>
<td>Environmental Engineering Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CE 3610</td>
<td>Basic Structural Analysis</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CE 3510</td>
<td>Soil Mechanics I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>(2) GenEd: CA 2</td>
<td></td>
<td>3</td>
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<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
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### Second Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 3520</td>
<td>Civil Engineering Materials</td>
<td>3</td>
</tr>
<tr>
<td>or ENVE 3200</td>
<td>Environmental Engineering Lab</td>
<td>3</td>
</tr>
<tr>
<td>CE / ENVE 3210</td>
<td>Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>or ENVE 3220</td>
<td>Water Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>(3) CE 3630</td>
<td>Steel Structure Design</td>
<td>4</td>
</tr>
<tr>
<td>or (4) Prof. Req.</td>
<td></td>
<td>3 or 4</td>
</tr>
<tr>
<td>(2) GenEd: CA 4</td>
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<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
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<td><strong>16</strong></td>
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</table>

### FOURTH YEAR – First Semester

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr.</th>
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<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td>CE 4900W</td>
<td>Civil Engineering Projects I</td>
<td>2</td>
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<tr>
<td></td>
<td>CE 2211</td>
<td>Engineering Economics I</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(4) Prof. Req.</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Or (3) CE 3610</td>
<td>Rein. Concrete Struct. Design</td>
<td>4</td>
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<td>(4) Prof.Req.</td>
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<td>(4) Prof. Req.</td>
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### Second Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CE 4920W</td>
<td>Civil Engineering Projects II</td>
<td>2</td>
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<tr>
<td>(4) Prof. Req.</td>
<td></td>
<td>3</td>
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<tr>
<td>(4) Prof. Req.</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Elective(s)</td>
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<td>3</td>
</tr>
<tr>
<td>Elective(s)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>17(6)</strong></td>
</tr>
</tbody>
</table>

### NOTES:

1. These courses may be taken either semester in the first year.
2. GenEd CA = Content Area in General Education Requirements (For current lists of GenEd courses, visit [http://geoc.uconn.edu](http://geoc.uconn.edu)). These courses may be taken at any time.
3. All students must take either CE 3630 or 3640.
4. Professional Requirements must be chosen to include at least one course from four of the following technical areas: Construction Management (CE 4210), Environmental (ENVE 3220 if also taken CE 3610, or ENVE 4310), Geotechnical (CE 4510 or 4541), Hydraulic/Water Resources (ENVE 4810 or 4820), Structural (CE 3630 or 3640), Surveying/Geodetic (CE 4410), and Transportation (CE 4710 or 4720 or 4750). The remaining two courses may be any course in engineering, mathematics or science not already used to satisfy another requirement at the 2000-level or higher or MGMT 5335 or OPIM 3801. See the next page for more details.
5. The Science Elective must be taken from the courses listed on the next page (or an approved substitute).
6. The credit totals for the last three semesters depend on how many structural design courses are chosen and when they are taken. If the second structural design class is selected as a professional requirement or if a 4 credit science elective is chosen, the number of free elective credits is reduced by one (each).
PROFESSIONAL REQUIREMENTS

The professional requirements are satisfied by eighteen (18) twenty one (21) credits of 2000-level or higher courses in engineering, science or mathematics, including MGMT 5335 and OPIM 3801. Following are specific restrictions on these courses:

**Proficiency in 4 CE Areas (12 Credits):** All CE students must take one course in each of the seven (7) technical areas listed in the table below as required courses. In addition, for the Professional Requirements, each student must take a second course from four of these areas listed as “Proficiency Courses”. (F) and (S) indicates if the course is typically offered in the First or Second semester. Some are offered in alternate years as indicated.

<table>
<thead>
<tr>
<th>Technical Areas</th>
<th>Required Courses</th>
<th>Proficiency Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Management</td>
<td>CE or ENVE 2251 Probability and Statistics in CEE (F)</td>
<td>CE 4210 Operations Research in CEE (S)</td>
</tr>
<tr>
<td>Environmental</td>
<td>ENVE 2310 Environmental Engineering Fundamentals (F)</td>
<td>ENVE 3220 Water Quality Engineering (S) or ENVE 4310 Environmental Modeling (S)</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>CE 3510 Soil Mechanics (F)</td>
<td>CE 4510 Foundation Design (S) or CE 4530 Geoenvironmental Engr (S – odd) or CE 4541 Advanced Soil Mechanics (F – even)</td>
</tr>
<tr>
<td>Hydraulic / Water Resources</td>
<td>CE 3120 or ENVE 3120 Fluid Mechanics (F)</td>
<td>ENVE 4810 Engineering Hydrology (F) or ENVE 4820 Hydraulic Engineering (S)</td>
</tr>
<tr>
<td>Structural</td>
<td>CE 3630 Steel Structure Design (S) or CE 3640 Reinforced Concrete Structure Design (F) CE 3610 Basic Structural Analyses (F)</td>
<td><strong>CE 3630 Steel Structure Design (S) or CE 3640 Reinforced Concrete Structure Design (F)</strong></td>
</tr>
<tr>
<td>Surveying / Geodetic</td>
<td>CE 2410 Intro. to Geospatial Analysis and Measurement (F)</td>
<td>CE 4410 Computer Aided Site Design (S)</td>
</tr>
<tr>
<td>Transportation</td>
<td>CE 2710 Transportation Engineering (S)</td>
<td>CE 4710 Case Studies in Transp. Engr. (F) or CE 4720 Highway Engr. – Design (S) or CE 4750 Pavement Design (F – even)</td>
</tr>
</tbody>
</table>

*ENVE 3220 is permitted for Professional Requirements only if CE 3610 was also taken.
**To meet proficiency in the Structural area, both courses must be taken.

Restrictions on the Remaining Six (6) Nine (9) Credits of Courses:

The remaining 6 9 credits may be satisfied by any course offered by the School of Engineering at the 2000 level or higher, or any science or mathematics course that were not used to meet another requirement in the curriculum. Following are specific restrictions to take note of:

- CE 3520 Civil Engineering Materials (S) or ENVE 3200 Environmental Engineering Laboratory (S) may be used only if the other was taken for the laboratory requirement
- CE 3610 Basic Structural Analysis (S) or ENVE 3220 Water Quality Engineering (S) may be used only if the other was taken to meet CE requirements
- “Science” means any course with one of the following subject designations: BIOL, CHEM, EEB, GEOG, GSCI, LAND, MARN, MATH, MCB, MEM, NRE, PHYS, SOIL, TURF

SCIENCE ELECTIVE

One of the following (or an approved substitution) must be taken:

- BIOL 1107: Principles of Biology (4 credits with lab; recommended concurrent CHEM 1127)
- EEB 2208: Introduction to Conservation Biology (3 credits)
- ENVE 4320: Ecological Engineering (3 credits; recommended prep ENVE3220 and 4210)
- GEOG 1300: Climate, Weather and the Environment (3 credits)
- GEOG 1302: GIS Modeling of Environmental Change (4 credits with lab)
- GEOG 2300: Introduction to Physical Geography (3 credits)
- GSCI 1050 / 1051: Earth and Life Through Time (4 credits with lab / 3 credits)
- GSCI 3710: Engineering and Environmental Geology (3 credits; recommended prep GSCI 1050 or 1051)
- NRE 3105: Wetlands Biology and Conservation (3 credits; recommended prep BIOL 1107 and 1108)
- PSYC 1100: General Psychology I (3 credits)
Item 2
Approved by CEE C&C on 10/07/2015
It is more convenient both for department and CE major students to complete senior design project in Fall spring. Therefore it is needed to change the pre-requisite courses for CE 4900W to allow all senior students to enroll in Fall. It was decided to remove the prerequisite and corequisite items and add “Open to senior standing Civil engineering majors and by consent”.

Current Catalog

4900W. Civil Engineering Projects I

Two credits. Two 3-hour discussion periods. Prerequisite or Corequisite: CE 2210; CE 2410; CE 2710; CE 3110; CE 3510; ENVE 2310; and ENVE 3120; Prerequisite: ENGL 1010 or 1011 or 2011; open only to junior and senior Civil Engineering majors.

Issues in the practice of civil and environmental engineering: management, business, public policy, leadership, importance of professional licensure, professional ethics, procurement of work, law/contracts, insurance/liability, global/societal issues (e.g., sustainable development, product life cycle), and construction management. Students working singly or in groups prepare proposals for civil engineering design projects, oral presentation and written reports.

Proposed Catalog

4900W. Civil Engineering Projects I

Two credits. Two 3-hour discussion periods. Prerequisite or Corequisite: CE 2210; CE 2410; CE 2710; CE 3110; CE 3510; ENVE 2310; and ENVE 3120; Prerequisite: ENGL 1010 or 1011 or 2011; open only to junior and senior Civil Engineering majors. Open to senior standing Civil engineering majors and by consent.

Issues in the practice of civil and environmental engineering: management, business, public policy, leadership, importance of professional licensure, professional ethics, procurement of work, law/contracts, insurance/liability, global/societal issues (e.g., sustainable development, product life cycle), and construction management. Students working singly or in groups prepare proposals for civil engineering design projects, oral presentation and written reports.
Item 3. NEW COURSE – CE 3251 Civil & Environmental Engineering
Applications of Probability and Statistics

Background
Starting with the catalog of 2015-16, CE and ENVE students must take CE 2251 and CE 2211 instead of CE 2210 (course descriptions for all three and the syllabus for CE 2251 appear below). CE 2251 will include four more weeks of statistics topics than CE 2210, including multiple regression and ANOVA (note that the course description for CE 2210 lists multiple regression; however in practice there has not been enough time to cover this). Many incoming students have credit for STAT 1100, either through Early College Experience or the AP Statistics exam (course description and syllabus appear below). Previously we would accept STAT 1100 as a substitute for the statistics portion of CE 2210; however with these additional topics in CE 2251, we can no longer do that. At the same time we recognize that many of the topics in CE 2251 are actually covered in STAT 1100.

Proposal
1. Create a new one-credit course CE 3251 Civil & Environmental Engineering Applications of Probability and Statistics
2. Amend the catalog to permit STAT 1100 + CE 3251 as a substitution for CE 2251
3. Amend the course description of CE and ENVE 2251 to indicate neither may be taken for credit along with CE 3251

Existing Course Descriptions
CE 2210. Decision Analysis in Civil and Environmental Engineering
(Also offered as ENVE 2330.) Three credits. Prerequisite: MATH 1122Q or 1132Q. May not be taken for credit if the student has taken CE 2251, 281, 2211 or ENVE 2251.

CE 2211. Engineering Economics
One credit. Prerequisite: Open only to Civil Engineering majors, instructor consent. Not open for credit to students who have taken CE 2210 or ENVE 2330.
e of money. Evaluation of alternative projects.
e of money. Evaluation of alternative projects.

CE 2251. Probability and Statistics in Civil and Environmental Engineering
(Also offered as ENVE 2251) Three credits. Recommended preparation: MATH 1121Q or 1131Q or 1151Q. This course and ENVE 2330 or CE 2210 or ENVE 2251 may not both be taken for credit.
Fundamentals of probability theory and statistics. Hypothesis testing, linear and multiple regression.

STAT 1100Q. Elementary Concepts of Statistics
Four credits. Three class periods and one discussion period. See credit restrictions above.
Standard and nonparametric approaches to statistical analysis; exploratory data analysis,
elementary probability, sampling distributions, estimation and hypothesis testing, one- and two-sample procedures, regression and correlation. Learning to do statistical analysis on a personal computer is an integral part of the course.

**Proposed Course Descriptions (additions marked with double underline)**

**CE 3251. Civil & Environmental Engineering Applications of Probability and Statistics**
One credit. Prerequisite: STAT 1100. Recommended Preparation: MATH 1121Q or 1131Q or 1151Q. This course and CE 2251 or ENVE 2251 may not both be taken for credit. Open only to Civil Engineering and Environmental Engineering majors.
Multiple Regression. Analysis of Variance. Student project applying probability or statistics in a civil or environmental engineering context.

**CE 2251. Probability and Statistics in Civil and Environmental Engineering**
(251) Three credits. Recommended preparation: MATH 1121Q or 1131Q or 1151Q. This course and ENVE 2330 or CE 2210 or ENVE 2251 or CE 3251 may not both be taken for credit. Fundamentals of probability theory and statistics. Hypothesis testing, linear and multiple regression. Analysis of Variance.

**ENVE 2251. Probability and Statistics in Civil and Environmental Engineering**
(251) Three credits. Recommended preparation: MATH 1121Q or 1131Q or 1151Q. This course and ENVE 2330 or CE 2210 or CE 2251 or CE 3251 may not both be taken for credit. Fundamentals of probability theory and statistics. Hypothesis testing, linear and multiple regression. Analysis of Variance.

**Course Syllabi (Samples)**
STAT 1100
CE 2251
CE 3251
University of Connecticut
STAT 1100, Elementary Concepts of Statistics

• Instructor
Zhanna Pozdnyakova
Office
AUST 321
Office Hours
Tue/Thu 2-3:15PM
Email
Zhanna.Pozdnyakova@uconn.edu

• Lectures
Tue/Thu 3:30-4:45PM, PB 36

• Texts
Mind on Statistics, 4th Ed.
Utts and Heckard
An Introduction to Data Analysis Using MINITAB 17, 5th Ed. for Uconn
McLaughlin and Wakefield

• Syllabus

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Assigned Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Data, Graphical Descriptive Techniques</td>
<td>Chapter 1 2.1 – 2.4</td>
</tr>
<tr>
<td>2</td>
<td>Numerical Summaries: Central Point and Variability</td>
<td>2.5 – 2.8</td>
</tr>
<tr>
<td>3</td>
<td>Percentiles, IQR, Box Plots, Outliers Scatterplots, Linear Regression</td>
<td>2.5 – 2.8 3.1 – 3.3</td>
</tr>
<tr>
<td>4</td>
<td>Introduction to Probability, Sample Spaces, Events, Probability Rules</td>
<td>7.1 – 7.4</td>
</tr>
<tr>
<td>5</td>
<td>Conditional Probability, Independent Events, Probability Trees</td>
<td>7.5, 7.7</td>
</tr>
<tr>
<td>6</td>
<td>Discrete Random Variables; Probability Distributions, Mean and Variance; Binomial Distribution</td>
<td>8.1 – 8.4</td>
</tr>
<tr>
<td>7</td>
<td>Continuous Probability Distributions; Normal Distribution</td>
<td>8.5 – 8.6</td>
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<tr>
<td>8</td>
<td>Bivariate Distributions, Independent Random Variables, Covariance, and Correlation</td>
<td>8.8</td>
</tr>
<tr>
<td>9</td>
<td>Limit Theorems, Sampling Distributions</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>10</td>
<td>Confidence Interval for a Population Mean</td>
<td>11.1 – 11.3</td>
</tr>
<tr>
<td>11</td>
<td>Confidence Interval for a Population Proportion; Sample Size Determination</td>
<td>10.2</td>
</tr>
<tr>
<td>12</td>
<td>Hypothesis Testing Test of Hypothesis about a Population Mean: z-test and t-test; p-value;</td>
<td>12.1, 13.1 – 13.3</td>
</tr>
<tr>
<td>13</td>
<td>Test of Hypothesis about a Population Proportion</td>
<td>12.2</td>
</tr>
</tbody>
</table>
• Exam Schedule
  – Midterm 1 – Th, Feb 19, 3:30-4:45PM, Sections 2.1-2.8, 3.1-3.3
  – Midterm 2 – Th, Apr 2, 3:30-4:45PM, Sections 7.1-7.5, 7.7, 8.1-8.6
  – Final – TBA

• MINITAB assignments
  All assignments are based on data sets in the textbook by McLaughlin and Wakefield. Attach your MINITAB output and present your answers written (or typed) neatly. Make sure you put your name and section number on each assignment. All pages have to be stapled. The MINITAB software is available via Skybox (http://skybox.uconn.edu/). See HuskyCT course website for additional information.
  You will submit your assignments to your TA during the discussion session. The penalty for late submission (within a week of the due date) is minus 2 pts (the total is 10 pts). No assignments will be accepted if it is late by more than one week.

<table>
<thead>
<tr>
<th>Assignment#</th>
<th>Due on week of</th>
<th>Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feb 22</td>
<td>Exercise 1 on p. 17 (only for ETHNIC1.MTW) Exercises 1 and 3 on p. 33 Exercises 1 and 4 on p. 49</td>
</tr>
<tr>
<td>2</td>
<td>Apr 5</td>
<td>Exercise 1 on p. 61; Exercise 1 on p. 77 Exercises 1, 2 and 3 on p. 103</td>
</tr>
<tr>
<td>3</td>
<td>Apr 19</td>
<td>Exercises 3 and 4 on p. 121</td>
</tr>
<tr>
<td>4</td>
<td>Apr 26</td>
<td>Exercises 1, 2, and 3 on p. 143</td>
</tr>
</tbody>
</table>

• Grades
  – Both midterm exams and final exam are in-class multiple choice exams,
  – Permitted material: a self-made formula sheet and a calculator
  – Grades are based on the following weighted sum:
    • midterms – 25% each
    • final – 30%  
    • in-class group quizzes – 10%
    • MINITAB labs – 10%
  – The letter grade will be assigned according to the following table.

<table>
<thead>
<tr>
<th>Cut-off</th>
<th>Letter Grade</th>
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<tbody>
<tr>
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<td>F</td>
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<tr>
<td>60</td>
<td>D-</td>
</tr>
<tr>
<td>63.33</td>
<td>D</td>
</tr>
<tr>
<td>66.66</td>
<td>D+</td>
</tr>
<tr>
<td>70</td>
<td>C-</td>
</tr>
<tr>
<td>73.33</td>
<td>C</td>
</tr>
<tr>
<td>76.66</td>
<td>C+</td>
</tr>
<tr>
<td>80</td>
<td>B-</td>
</tr>
<tr>
<td>83.33</td>
<td>B</td>
</tr>
<tr>
<td>86.66</td>
<td>B+</td>
</tr>
<tr>
<td>90</td>
<td>A-</td>
</tr>
<tr>
<td>95</td>
<td>A</td>
</tr>
</tbody>
</table>

No rounding, even if your course score is 94.9999 you will get A-.
To make up exams you need to provide a compelling reason (for instance, a doctor note); make-up exams are not multiple choice.

There are no make-up quizzes. However, in order to address unforeseen circumstances (illness, car problems etc), the two lowest quiz scores will be dropped.

No extra credit projects. Consider your MINITAB assignments and group quizzes as extra credit work. I expect you to get full or close to full credit for these two course components, regardless of your math background.

In the end of semester you must check all your grades and resolve all the issues if there are any. No score changes will be made after the last week of classes.

**Other things**

- If you miss a class, it is your responsibility to get notes from somebody else and go over material in our text. I only can help you with specific questions.
- I will respond to your email within 48 hours.
- Your TAs are in charge of the MINITAB assignments. You should address your MINITAB questions to your TA.
- If you have a course related question, please check HuskyCT course website first. Most likely you will find an answer.

**Final Exam**

Students are required to be available for their exam during the stated time. If you have a conflict with this time you must visit the Office of Student Services and Advocacy to discuss the possibility of rescheduling this exam. Please note that vacations, previously purchased tickets or reservations, graduations, social events, misreading the exam schedule and over-sleeping are not viable excuses for missing a final exam. If you think that your situation warrants permission to reschedule, please contact the Office of Student Services and Advocacy with any questions. Thank you in advance for your cooperation.

**Academic Integrity**

A fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgement of the research and ideas of others. Misrepresenting someone else’s work as one’s own is a serious offense in any academic setting and it will not be condoned.

Academic misconduct includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation (e.g. papers, projects, and examinations); any attempt to influence improperly (e.g. bribery, threats) any member of the faculty, staff, or administration of the University in any matter pertaining to academics or research; presenting, as one’s own, the ideas or words of another for academic evaluation; doing unauthorized academic work for which another person will receive credit or be evaluated; and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved.

A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation.¹

¹The Student Code, Part VI: Academic Integrity in Undergraduate Education and Research
CE 2251: Probability and Statistics in Civil Engineering
Fall 2015
MWF Timing: TBD

Instructor
Karthik C Konduri
Office: CAST 329; Phone: (860) 486 2733; Email: kkonduri@engr.uconn.edu
Office Hours: TBD

Prerequisite
Recommended preparation: MATH 1122 or 1132 (or approved substitution) – generally it is required that the student have a background in calculus.

Textbook
• Lecture notes and other material will be made available on the HuskyCT course website

Course Objective
The objective of the course is to introduce concepts and approaches from the field of probability, and statistics that can be applied to the analysis of problems in civil engineering

Course Outcomes
Students are expected to be able to do the following at the successful completion of the course:
1. Quantitatively and qualitatively describe data from experiments
2. Identify random variables for a given experiment and properties of random variables including mean, variance, and probability of events
3. Select appropriate distributions to represent the population being analyzed in an experiment
4. Identify appropriate statistics for summarizing data from experiments; subsequently estimate confidence intervals, and test hypothesis
5. Estimate relationships between dependent and independent variables and interpret results

Course Grading

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>20%</td>
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<tr>
<td>Quizzes</td>
<td>5%</td>
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<tr>
<td>Midterm Exams</td>
<td>45%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
</tbody>
</table>

Homework
• There will be a total of 10 homework assignments
• Each homework assignment will include about 5 problems
• Due dates will be as noted in the class schedule and late submissions will not be graded
• Instructions for homework assignments,
  o Write your name, and course number before turning in your homework sets
  o Write your solutions on an A4 sized paper, printer paper, or engineering notebook paper only
  o Clearly identify the problem number before writing up the solution for the problem
Homework sets must be stapled together in assigned order
- Please write neatly or type up your solutions to ensure they are legible
- While collaboration is acceptable and encouraged, copying and/or any forms of cheating will not be tolerated

Quizzes
- There will be announced/unannounced concept quizzes (multiple choice) over the semester

Exams
- There will be three midterm exam and a final exam
- No makeup exams will be offered without prior arrangement with the instructor
- Students must adhere to University regulations regarding final exams

Class Conduct
- Attend classes, participate in classroom exercises and discussions, and ask questions
- This is a large class so please be respectful of your, your fellow students, and your instructor’s time. Disruptive behavior of any kind will not be tolerated. A student that disrupts class will be given one warning. If the disruptive behavior continues, the student’s name will be given to the Assistant Dean for Undergraduate Education for further disciplinary action.
- Use of technology and devices including computers, cellphones and tablets for non-scholastic purposes will not be tolerated. Please turn your cellphones to silent mode at the beginning of the class.

Academic Integrity
Students will be held to the standards laid out in the The Student Code -- http://www.community.uconn.edu/student_code.html

Communication
- **Student to Instructor**
  - Email, Office Hours
- **Student to Teaching Assistants**
  - Email, Office Hours
- **Instructor/Teaching Assistants to Students**
  - HuskyCT
Prerequisite
Prerequisites: MATH 1132 and STAT 1100 (or equivalent statistics course). This course and CE 2251 or ENVE 2251 may not both be taken for credit.

Textbook
• Lecture notes and other material will be made available on the HuskyCT course website

Course Objective
The objective of the course is to cover topics not covered in STAT 1100 that are included in CE 2251. This course along with STAT 1100 is equivalent to the requirement of CE 2251 in the CE and ENVE programs.

Course Outcomes
Students are expected to be able to do the following at the successful completion of the course:
1. Quantitatively and qualitatively describe data from experiments
2. Identify random variables for a given experiment and properties of random variables including mean, variance, and probability of events
3. Select appropriate distributions to represent the population being analyzed in an experiment
4. Identify appropriate statistics for summarizing data from experiments; subsequently estimate confidence intervals, and test hypothesis
5. Estimate relationships between dependent and independent variables and interpret results

Course Grading

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
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<tr>
<td>Quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>Project</td>
<td>30%</td>
</tr>
<tr>
<td>Exam</td>
<td>45%</td>
</tr>
</tbody>
</table>

Homework
• There will be a total of 3 homework assignments
• Each homework assignment will include about 5 problems
• Due dates will be as noted in the class schedule and late submissions will not be graded
• Instructions for homework assignments,
  o Write your name, and course number before turning in your homework sets
  o Write your solutions on an A4 sized paper, printer paper, or engineering notebook paper only
  o Clearly identify the problem number before writing up the solution for the problem
  o Homework sets must be stapled together in assigned order
  o Please write neatly or type up your solutions to ensure they are legible
• While collaboration is acceptable and encouraged, copying and/or any forms of cheating will not be tolerated

Quizzes
• There will be announced/unannounced concept quizzes (multiple choice)
Project
- Each student will complete a project applying probability and/or statistics to an engineering context with real datasets, either collected by the student or provided by others.

Exams
- There will be one exam
- No makeup exams will be offered without prior arrangement with the instructor
- Students must adhere to University regulations regarding exams

Class Conduct
- Attend classes, participate in classroom exercises and discussions, and ask questions
- This is a large class so please be respectful of your, your fellow students, and your instructor’s time. Disruptive behavior of any kind will not be tolerated. A student that disrupts class will be given one warning. If the disruptive behavior continues, the student’s name will be given to the Assistant Dean for Undergraduate Education for further disciplinary action.
- Use of technology and devices including computers, cellphones and tablets for non-scholastic purposes will not be tolerated. Please turn your cellphones to silent mode at the beginning of the class.

Academic Integrity
Students will be held to the standards laid out in the The Student Code -- [http://www.community.uconn.edu/student_code.html](http://www.community.uconn.edu/student_code.html)

Communication
Student to Instructor Email, Office Hours
Student to Teaching Assistants Email, Office Hours
Instructor/Teaching Assistants to Students HuskyCT
CE Program Course and Catalog Changes

II. Add STAT as an acceptable subject area for Professional Requirements

Following is the current list of subject areas acceptable for the professional requirements in CE:

- BIOL (Biology)
- CHEM (Chemistry)
- EEB (Ecology and Evolutionary Biology)
- GEOG (Geography)
- GSCI (Geological Sciences)
- LAND (Landscape Architecture)
- MARN (Marine Sciences)
- MATH (Mathematics)
- MCB (Molecular and Cell Biology)
- MEM (Management and Engineering for Manufacturing)
- NRE (Natural Resources and the Environment)
- PHYS (Physics)
- SOIL (Soil Science)
- TURF (Turfgrass Science)
- Any department in the school of engineering

We realized that our working definition of “math, science or engineering” should also include statistics (STAT), which is not on this list. Therefore we propose to add STAT to the above list, which will then be:

- BIOL (Biology)
- CHEM (Chemistry)
- EEB (Ecology and Evolutionary Biology)
- GEOG (Geography)
- GSCI (Geological Sciences)
- LAND (Landscape Architecture)
- MARN (Marine Sciences)
- MATH (Mathematics)
- MCB (Molecular and Cell Biology)
- MEM (Management and Engineering for Manufacturing)
- NRE (Natural Resources and the Environment)
- PHYS (Physics)
- SOIL (Soil Science)
- STAT (Statistics)
- TURF (Turfgrass Science)
- Any department in the school of engineering
III. **Change in number of required professional elective credits**

Other catalog course changes that have been proposed affect the number of required course credits in CE:

- Change from requiring CE 3630 or 3640 (each 4 credits) to a professional requirement (3 credits)
- Removing the lab portion of CE 3510 and reducing the course from 4 credits to 3 credits.

This results in a net decrease in required courses for CE of two credits and thus a total of eight free elective credits. We propose that instead of these credits being unrestricted, that we increase the required professional requirement credits to 24. Following would be the catalog copy for the professional requirements:

**Current Catalog Copy:**
The professional requirements are satisfied by eighteen (18) credits of 2000-level or higher courses in engineering, science, or mathematics or MGMT 5335 or OPIM 3801. At least one course each from four of the following different technical areas must be selected:

- Construction Management Engineering: CE 4210
- Environmental/Sanitary Engineering: ENVE 3220, 4310 (ENVE 3220 may be used only to fill the professional requirements by students who have taken CE 3610)
- Geotechnical Engineering: CE 4510, 4530, 4541
- Hydraulic/Water Resources Engineering: ENVE 4810, 4820
- Structural Engineering: CE 3630 or 3640
- Surveying/Geodetic: CE 4410
- Transportation Engineering: CE 4710, 4720, 4750

No course that was used to meet another Civil Engineering course requirement may double count as a Professional Requirement. Courses taken from the above list but not used to fulfill the four technical area requirements may be used to satisfy remaining professional requirements. Following is a list of suggested courses that may also be considered for the professional requirements: CE 2120; CE 3520 or ENVE 3200 (if both taken); CE 3610 or ENVE 3220 (if both taken); CE 3630 or CE 3640 (if both taken); CE 4610, 4730, 4740; EEB 3247; ECE 2000; ENVE 4800; GSCI 3710.

**Proposed Catalog Copy:**
The professional requirements are satisfied by twenty-four (24) credits of 2000-level or higher courses in engineering, science, or mathematics or MGMT 5335 or OPIM 3801. At least one course each from four of the following different technical areas must be selected:

- Construction Management Engineering: CE 4210
- Environmental/Sanitary Engineering: ENVE 3220, 4310
- Geotechnical Engineering: CE 4510, 4530, 4541
- Hydraulic/Water Resources Engineering: ENVE 4810, 4820
- Structural Engineering: CE 3630, 3640
- Surveying/Geodetic: CE 4410
- Transportation Engineering: CE 4710, 4720, 4750

No course that was used to meet another Civil Engineering course requirement may double count as a Professional Requirement. Courses taken from the above list but not used to fulfill the four technical area requirements may be used to satisfy remaining professional requirements. Following is a list of suggested courses that may also be considered for the professional requirements: CE 2120; CE 3520 or ENVE 3200 (if both taken); CE 3610 or ENVE 3220 (if both taken); CE 3630 or CE 3640 (if both taken); CE 4610, 4730, 4740; EEB 3247; ECE 2000; ENVE 4800; GSCI 3710.
Item 4
Approved by ENVE group on 10/21/2015
Adding 1 course to Professional Requirements list to diversify Spring options

Area 8. Atmospheric Processes

NRE 3146. Climatology

Three credits. Instructor: Yang

Fundamentals of climatology: elements, processes, and mechanisms that govern or affect the climate and climate change, climatological theories and observations, climate across spatial and temporal scales, scientific methods for climatic analysis and applications.

Item 5
Approved by CEE C&C 11/04/2015

We would like to add lab component to ENVE3120 (Fluid Mechanics). Here is justification

a) This will be the only course that CE students will have opportunity to be exposed to water resources experiments during the lab.

b) This lab will help CEE program To satisfy ABET assessment criterion 3 (item b, d, and g)

c) Current pilot lab (Fall 15) has been very successful and well received by students.

Current Catalog

3120. Fluid Mechanics
(Also offered as CE 3120.) Three credits. Prerequisite: MATH 2110 or MATH 2410Q; enrollment in the School of Engineering. Recommended preparation: CE 2120. This course and ME 3250 may not both be taken for credit.

Statics of fluids, analysis of fluid flow using principles of mass, momentum and energy conservation from a differential and control volume approach. Dimensional analysis. Application to pipe flow and open channel flow.

Proposed New Catalog Description

3120. Fluid Mechanics
(Also offered as CE 3120.) Four credits. Three class periods and one 3-hour laboratory period.

Prerequisite: MATH 2110 or MATH 2410Q; enrollment in the School of Engineering. Recommended preparation: CE 2120. This course and ME 3250 may not both be taken for credit.

Statics of fluids, analysis of fluid flow using principles of mass, momentum and energy conservation from a differential and control volume approach. Dimensional analysis. Application to pipe flow and open channel flow. Laboratory activities and written lab reports.

Item 6
Approved by CEE C&C 11/04/2015

We have offered “GIS Applications in Civil & Environmental Engineering” under CE 3995 during Spring 15 and Spring 16 (Special topics in Civil engineering). We would like to create a course number as follow. The course is cross listed with GEOG 2500. We will use the same catalog description.
CE 2500. GIS Applications in Civil & Environmental Engineering

(Also offered as GEOG 2500. Four credits) Four credits. Recommended preparation: CE 2410. One 2-hour lecture and two 2-hour laboratory periods.

Fundamental principles of geographic information systems (GIS). Topics include history of the field, components of a GIS, the nature and characteristics of spatial data, methods of data capture and sources of data, database models, review of typical GIS operations and applications. Laboratory exercises provide experience with common computer-based systems.

GEOG 2500. Introduction to Geographic Information Systems

(Formerly offered as GEOG 4500.) Four credits. One 2-hour lecture and two 2-hour laboratory periods.

Fundamental principles of geographic information systems (GIS). Topics include history of the field, components of a GIS, the nature and characteristics of spatial data, methods of data capture and sources of data, database models, review of typical GIS operations and applications. Laboratory exercises provide experience with common computer-based systems.

GIS Applications in Civil & Environmental Engineering

CE3995 / CE5090-002 – Spring 2015

Meets Monday & Wednesday 3:35-4:25pm
room: Castleman 201
Lab Sessions: 001 Thursday 9-11am
002 Thursday 11am-1pm
room: Castleman 117

Professor Dr. Amy C. Burnicki
Office Hours: Tuesday & Thursday 3:30-4:30pm Office: Castleman 326
e-mail: amy.burnicki@uconn.edu phone: 486-2340

Webpage HuskyCT [CE-3995-SEC001-5090-SEC002]

Course Description
Civil and environmental engineers increasingly utilize spatially-referenced data and GIS software to solve problems related to water resources, transportation, urban planning, and environmental impact analysis. The successful application of GIS in civil and environmental engineering requires an appreciation of the importance of spatial relationships, an understanding of the technical capabilities of computer-based information systems, and the appropriate GIS software skills.

This course introduces students to the fundamental concepts and principles of geographic information systems (GIS) and demonstrates how GIS can be applied to solve CEE problems. The goal of this course is to provide students with a comprehensive understanding of geographic data management and analysis as it applies to CEE-related applications. This requires an understanding of basic concepts (i.e., lecture) and practice
implementing them with GIS software (i.e., lab). The course emphasizes and explores CEE-related GIS data, analytical tools and applications. Among the topics covered in this course are: spatial data models and management, spatial coordinates systems, spatial analysis, terrain mapping, watershed and stream network delineation, spatial interpolation, pattern analysis, and network analysis.

Course Objectives
At the completion of this course, students will:

• appreciate the utility of spatial data in engineering problem solving
• understand the fundamental concepts and principles underlying the acquisition, organization and management of spatial data
• comprehend and apply basic spatial analyses to solve engineering problems
• become proficient users of GIS software
• practice professional communication through the preparation of laboratory assignments and learn to effectively communicate findings via visualization

Course Prerequisites
Recommended prerequisite: CE 2410
The course is designed so that students without a GIS background can succeed, but previous experience will no doubt be helpful. Although not required for this course, courses in the following areas can be helpful background work in GIS: remote sensing and image interpretation, statistics, cartography, geomatics, surveying, and computer programming.
Readings
The textbook required for this course is:

There are several good texts covering introductory GIS. Additional helpful texts include:

Course Expectations & Evaluation
Students are expected to attend and participate in all class meetings, attend all laboratory sessions, and complete course readings. Attendance is essential to your understanding of and performance in both lecture and lab. From my experience, the single best predictor of performance in class is consistent attendance. Attendance will be recorded at each lab meeting. Planned absences should be brought to the instructor’s attention prior to the missed class.

This course requires a substantial amount of work. Lab assignments will require work outside of class and lab times. Students can obtain a one-year, student copy of the GIS software (ArcGIS 10.2) for their personal use. Interested students should email Dr. Burnicki to receive download instructions and an authorization code.

Undergraduate students:
Your grade will be based on your performance on twelve laboratory assignments, two lecture exams, a lab exam, and a set of project assessments.

Graduate students:
Your grade will be based on your performance on twelve laboratory assignments, two lecture exams, a lab exam, and an end-of-term project.

*There will be no extra credit.*

Lab assignments: Lab assignments will emphasize civil and environmental engineering-related GIS applications. All lab assignments are due prior the next lab session. I recommend you keep a lab notebook (digital or hardcopy), as later labs and the lab exam will require you to perform tasks that were described in detail in previous lab assignments.

Lab exam: Students will complete a lab exam during the class week of the course. The exam will cover skills learned during the lab portion of the course. The lab exam is a take-home exam, but lab work is required. The final laboratory session of the semester has been designated for the lab exam (see course schedule).

Lecture exams: There are two, non-comprehensive lecture exams. Lecture exams will focus on your understanding of the concepts presented in class. If you have a conflict (e.g., religious observation, scheduled conference, scheduled athletic team event) with the date/time of an exam, you need to notify Dr. Burnicki within the first three weeks of the term so a make-up exam can be scheduled. If you miss an exam without prior notification, you will need to provide proof (e.g., medical emergency).

Project: Each graduate student is required to complete an end-of-term project that applies spatial analysis methods learned in class. The purposes of this project are to:
a. Explore in-depth a subject of personal interest to you and develop experience in the use of GIS to solve that problem
b. Provide experience in the formulation, execution, and presentation of original research

Your project grade will be based on: (1) project proposal, (2) project status report, (3) presentation (held during the last week of class; see course schedule), and (4) final report. More detailed information regarding the semester project will be distributed and discussed in class in the upcoming weeks.

Project Assessments: All undergraduate students must complete a set of project assessments during the last week of the course. The assessments will require you to (1) identify type of data and spatial analyses performed in each end-of-term project and (2) evaluate the strengths/weaknesses of GIS approaches in solving practical CEE problems.

### Grade Calculation

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<th>Grad</th>
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<td>93 or above</td>
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<td>End-of-Term Project</td>
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<td>73 – 76.9</td>
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<td>70 – 72.9</td>
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<td>below 60</td>
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### Additional Information

- Every effort will be made to accommodate the needs of students with hearing, visual, or other impairments and/or learning disabilities. Please notify your instructor and provide necessary documentation.
- A note on student work. Group discussion during lab sessions is expected and encouraged. However, lab assignments must be completed individually by each student. It is expected that work submitted by a student reflects his or her original ideas and responses. Submissions that reflect substantially similar work by more than one student will be dealt with as an act of scholarly dishonesty and a failing grade will be issued. Students are expected to be familiar with the university policies on academic misconduct as detailed in the UCONN student code: [http://www.community.uconn.edu/student_code.html](http://www.community.uconn.edu/student_code.html)
**Course Schedule**

Changes to the schedule may be necessary based on class progress, but it is my intention to keep changes to a minimum. All changes will be announced in class and posted on the course website. It is your responsibility to stay apprised of changes to the course schedule.

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Topic</th>
<th>Reading</th>
<th>Lab</th>
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<tr>
<td>1</td>
<td>Jan 21&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Jan 26&lt;sup&gt;th&lt;/sup&gt; Introduction to GIS &amp; Applications in Civil &amp; Environmental Engineering</td>
<td>Ch1</td>
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<td>Jan 28&lt;sup&gt;th&lt;/sup&gt; Measuring Geospatial Data</td>
<td>Ch2: 25-34 &amp; 58-61 ArcGIS: Mapping land use and population centers</td>
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<td>2</td>
<td>Jan 28&lt;sup&gt;th&lt;/sup&gt; Maps as Models</td>
<td>Ch4: 131-40 &amp; 164-71 and Ch9: 359-66</td>
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<td>Feb 2&lt;sup&gt;nd&lt;/sup&gt; Vector Data Models</td>
<td>Ch2: 34-43 &amp; 55-56 Spatial Data</td>
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<td>Ch2: 44-54 &amp; 61-63 Structures</td>
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<td>Feb 9&lt;sup&gt;th&lt;/sup&gt; Projections &amp; Coordinate Systems</td>
<td>Ch3: 71-119 Projections &amp; Coordinate</td>
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<td>Ch8: 307-20 Systems</td>
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<td>Feb 16&lt;sup&gt;th&lt;/sup&gt; CEE Data Sources</td>
<td>Ch7, Ch9: 347-58 &amp; 368-9 and Ch10: 407-18 Hydrology data</td>
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<td>Feb 23&lt;sup&gt;rd&lt;/sup&gt; Map Overlay</td>
<td>Ch9: 370-6 Vector Analysis 1: Exploring land-use patterns</td>
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<td>Mar 2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>Mar 4&lt;sup&gt;th&lt;/sup&gt; Review</td>
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<td>Mar 9&lt;sup&gt;th&lt;/sup&gt; Suitability Mapping</td>
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<td>Ch10: 434-7 Terrain Analysis &amp; Cost Distance</td>
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<td>Apr 6&lt;sup&gt;th&lt;/sup&gt; Spatial Interpolation</td>
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<td>Apr 8&lt;sup&gt;th&lt;/sup&gt; Geocoding &amp; Networks</td>
<td>Ch9: 395-6 Mapping ozone</td>
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<td>Apr 13&lt;sup&gt;th&lt;/sup&gt; Network Analysis</td>
<td>Ch9: 390-5 Network Analysis:</td>
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Apr 15th  Pattern Analysis  Ch12: 487-91 routing
Apr 20th  Cartographic Modeling  Ch13: 521-4 & 533-44
Apr 22nd  Review  Pattern Analysis: Exploring bike-route densities
Apr 28th  Project Presentations  Lab Final
Apr 30th  Project Presentations
Computer Science & Engineering Course & Curriculum:

1. Changes to CSE 1729.
We would like to add a prerequisite and remove the credit restriction on CSE 1729: specifically we would like to put CSE 1010 as a prerequisite, and remove the credit restriction that keeps students from taking both CSE 1010 and CSE 1729 for credit.

Proposed catalog copy:

**CSE 1729. Introduction to Principles of Programming**
Three credits. Two 1-hour lectures and one 2-hour laboratory. Prerequisite: CSE 1010. CSE 1729 may be used in place of CSE 1010 to fulfill any requirement fulfilled by CSE 1010. An introduction to computer programming in a structured programming language including fundamental elements of program design and analysis. Data and functional abstraction as tools for constructing correct, efficient, and intelligible programs for a variety of common computing problems. Building on the material in CSE 1010, its focus on abstraction makes it appropriate for students seeking a deeper understanding of computing fundamentals as well as those planning on continued study in computing.

Current catalog copy:

**CSE 1729. Introduction to Principles of Programming**
Three credits. Two 1-hour lectures and one 2-hour laboratory. Not open for credit to students who have passed CSE 110, 123, 1100, or 1010. CSE 1729 may be used in place of CSE 1010 to fulfill any requirement fulfilled by CSE 1010. An introduction to computer programming in a structured programming language including fundamental elements of program design and analysis. Data and functional abstraction as tools for constructing correct, efficient, and intelligible programs for a variety of common computing problems. While this course covers the material in CSE 1010, its focus on abstraction makes it appropriate for students seeking a deeper understanding of computing fundamentals as well as those planning on continued study in computing.

2. Make CSE 3100 – Systems Programming a required course.
CSE 3100, Systems Programming, is being offered for the second time this semester (was offered in Fall 2014 as a special topics course). All indications are that it provides skills useful in upper-level courses (particularly Operating Systems and Senior Design). We would like to make it a requirement of both the CSE and CS programs.

Current catalog description (no need to change):

**CSE 3100. Systems Programming**
Three credits. Two 1-hour lectures and one 2-hour laboratory per week. Prerequisite: CSE 2100. Introduction to system-level programming with an emphasis on C programming, process management, and small scale concurrency with multi-threaded programming. Special attention will be devoted to proficiency with memory management and debugging facilities both in a sequential and parallel setting.
Proposed CSE curriculum changes: Overview

<table>
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<tr>
<th>Course</th>
<th>Title</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 1010</td>
<td>Intro to computing for engineers</td>
<td>(Matlab)</td>
</tr>
<tr>
<td>CSE 1729</td>
<td>Intro to principles of programming</td>
<td>(Scheme)</td>
</tr>
<tr>
<td>CSE 1102</td>
<td>Object-oriented design and programming</td>
<td>(Java)</td>
</tr>
<tr>
<td>CSE 2050*</td>
<td>Data Structures and object-oriented design</td>
<td>(Java)</td>
</tr>
<tr>
<td>CSE 2100</td>
<td>Data structures and intro to algorithms</td>
<td>(Java)</td>
</tr>
<tr>
<td>CSE 2102</td>
<td>Software engineering</td>
<td>(Java)</td>
</tr>
<tr>
<td>CSE 2500</td>
<td>Discrete systems</td>
<td>(none)</td>
</tr>
<tr>
<td>CSE 3100</td>
<td>Systems programming</td>
<td>(C)</td>
</tr>
<tr>
<td>CSE 3102*</td>
<td>Software architecture and languages</td>
<td>(multiple)</td>
</tr>
<tr>
<td>CSE 3500</td>
<td>Algorithms and complexity</td>
<td>(none)</td>
</tr>
</tbody>
</table>

Figure 1: Course numbers, names, and currently-associated languages for courses referred to in this report. * indicates proposed new courses.

1. Introductory sequence

The current introductory sequence (roughly those courses taken in the first two years by CS majors, and the first 5 semesters by CSE majors who also take courses in digital and analog circuits) is CSE 1010 or CSE 1729, followed by CSE 1102, followed by CSE 2500 and CSE 2100, followed by CSE 2102 and CSE 3500.

Two observations:

- A substantial minority of the students taking CSE 1729 in their first semester are relatively underprepared— they have had no programming high-school coursework or experience, and are at a significant disadvantage. Many of these people drop the course or get low grades.

- There is a substantial conceptual overlap between CSE 1729 and CSE 2100 in terms of the data structures used and manipulated: particularly trees, binary search trees, and heaps. Given this, the students who take CSE 1729 have a significant advantage when taking CSE 2100 over their peers who took CSE 1010.

- At the end of this sequence, students are generally strong Java programmers, but have only seen Java and one other language, Matlab or Scheme.

We plan to address this by restructuring the introductory sequence. In the new sequence, CSE 1010 will be a prerequisite of CSE 1729. The material in CSE 1102 and CSE 2100 will be combined into a new course, CSE 2050, to be followed by CSE 2102 (Software Engineering) and CSE 3100 (Systems programming). From a concept standpoint this sequence is roughly equivalent, somewhat more emphasis on systems-level concepts like threads, somewhat less emphasis on object orientation. From a language standpoint it is richer: CSE 3100 teaches the C language, all students will have Matlab, Scheme, and Java, and CSE 3102 will support multiple languages and some inter-language comparisons. We are exploring the possibility of teaching CSE 1729 in Python rather than Scheme, and plan to include some C programming in CSE 1010 in addition to Matlab.
2. Core and Concentrations

The core requirements for both CS and CSE are given in the following table:

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Name</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 1010</td>
<td>Intro. Computing for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CSE 1729</td>
<td>Intro. Principles of Programming</td>
<td>3</td>
</tr>
<tr>
<td>CSE 2050*</td>
<td>Data Structures and Object-oriented Design</td>
<td>3</td>
</tr>
<tr>
<td>CSE 2102</td>
<td>Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CSE 2500</td>
<td>Discrete Systems</td>
<td>3</td>
</tr>
<tr>
<td>CSE 3100</td>
<td>Systems Programming</td>
<td>3</td>
</tr>
<tr>
<td>CSE 3500</td>
<td>Algorithms and Complexity</td>
<td>3</td>
</tr>
<tr>
<td>CSE 3000</td>
<td>Contemporary Issues in CSE</td>
<td>1</td>
</tr>
<tr>
<td>CSE 4939W</td>
<td>CSE Design Project I</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4940</td>
<td>CSE Design Project II</td>
<td>3</td>
</tr>
<tr>
<td>total</td>
<td></td>
<td>28</td>
</tr>
</tbody>
</table>

2.1 CSE program core supplement

For a CSE degree, the following courses are additionally required:

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Name</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 2300W</td>
<td>Digital Logic Design</td>
<td>4</td>
</tr>
<tr>
<td>ECE 2001</td>
<td>Electrical Circuits</td>
<td>4</td>
</tr>
<tr>
<td>CSE 3666</td>
<td>Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>total beyond CS</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

2.2 Beyond the core

Given the core is at least 28 credits, and we need at least 43 CSE credits for accreditation, we need at least 15 CSE credits beyond the core. A straightforward way to ensure this is to require that all students complete a concentration (12 credits) plus sufficient elective CSE credits so the CSE credits in concentration and electives is at least 15 – 5 courses if chosen with care.

3 Concentrations

A concentration is a group of 4 courses in a specific area, chosen to guarantee some depth in an area. A student’s concentration will appear on his or her transcript. These will generally have at least one required course, and a limited number of choices at the undergraduate or beginning graduate level. Courses may appear in more than one concentration, but students must choose a single concentration. No course that is otherwise required for a student’s degree program may be counted toward a concentration.

The following set of concentrations reflect what we can offer near-term; the courses are either current or planned offerings. The number of concentrations, and courses allowed in each, are expected to increase over time. The available concentrations and their requirements will be published in the annual Guides to Course Selection for the CS and CSE degrees. For each concentration we present a list of courses that may be used, with required courses in bold.

3.1 Algorithms and Theory

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Name</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 3502</td>
<td>Theory of Computation</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4500</td>
<td>Parallel Systems</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4702</td>
<td>Intro to Cryptography</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4704</td>
<td>Computational Geometry</td>
<td>3</td>
</tr>
<tr>
<td>CSE 3802</td>
<td>Numerical Methods</td>
<td>3</td>
</tr>
</tbody>
</table>
3.2 Systems and Networks

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 3300</td>
<td>Networks</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4300</td>
<td>Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4302</td>
<td>Computer Organization and Architecture</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4709</td>
<td>Networked Embedded Systems</td>
<td>3</td>
</tr>
<tr>
<td>CSE xxxx</td>
<td>Intro to Computer and Network Security (new)</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5300</td>
<td>Advanced Networks</td>
<td>3</td>
</tr>
</tbody>
</table>

3.3 Cybersecurity

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 3502</td>
<td>Theory of Computation</td>
<td>3</td>
</tr>
<tr>
<td>CSE xxxx</td>
<td>Intro to Computer and Network Security (new)</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4702</td>
<td>Introduction to Modern Cryptography</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4707/5850</td>
<td>Computer Security</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5852</td>
<td>Modern Cryptography: Foundations</td>
<td>3</td>
</tr>
</tbody>
</table>

*The CSE degree also requires one additional Math course, and has less flexibility for science courses.*
3.4 Bioinformatics

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 3800</td>
<td>Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>CSE 3810</td>
<td>Computational Genomics</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4095</td>
<td>Big Data Analytics</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5820</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5810</td>
<td>Intro to Biomedical Informatics</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5860</td>
<td>Computational Problems in Evolutionary Genomics</td>
<td>3</td>
</tr>
</tbody>
</table>

3.5 Software design and development

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 2102</td>
<td>Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4701</td>
<td>Principles of Data Bases</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4102</td>
<td>Programming Languages</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5103</td>
<td>Software performance engineering</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5104</td>
<td>Software reliability engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

3.6 Computational Data Analytics

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 4095</td>
<td>Big Data Analytics</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4701</td>
<td>Principles of Data Bases OR</td>
<td>3</td>
</tr>
<tr>
<td>OPIM 3221</td>
<td>Business Database Systems</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4095</td>
<td>Dynamic Data Visualization OR</td>
<td>3</td>
</tr>
<tr>
<td>OPIM 4895</td>
<td>Visual Analytics</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4705</td>
<td>Intro to AI</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5713</td>
<td>Data Mining OR</td>
<td>3</td>
</tr>
<tr>
<td>OPIM 3802</td>
<td>Data and Text Mining</td>
<td>3</td>
</tr>
<tr>
<td>CSE 5095</td>
<td>Discrete Optimization OR</td>
<td>3</td>
</tr>
<tr>
<td>OPIM 3803</td>
<td>Spreadsheet modeling for Business Analytics</td>
<td>3</td>
</tr>
</tbody>
</table>

3.7 Unspecialized

For the Unspecialized concentration, students must take 3 different required concentration courses, plus any other 2000+ level CSE course not used to fulfill another requirement (i.e. not in the core).

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 3502</td>
<td>Theory of Computation</td>
<td>3</td>
</tr>
<tr>
<td>CSE 4095</td>
<td>Big Data Analytics</td>
<td>3</td>
</tr>
<tr>
<td>CSE 2102</td>
<td>Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CSE xxxx</td>
<td>Intro to Computer and Network Security (new)</td>
<td>3</td>
</tr>
<tr>
<td>CSE 3800</td>
<td>Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>CSE xxxx</td>
<td>Any other 2000+ CSE course not used to fulfill another requirement</td>
<td>3</td>
</tr>
</tbody>
</table>

3.8 Individually Designed

Students may propose an individually-designed concentration to fit their academic or career interests. This will be a minimum of 12 credits at the 2000+ level, proposed by the student and approved by the student's advisor and the CSE Department Undergraduate Committee. The expectation is that such a concentration will have a strong unifying theme. This may include non-CSE courses, but the student will still be subject to the 15 CSE credits outside of the core requirement.
New course: Data Structures and Object-oriented Design

This course, plus its prerequisite CSE 1729, will take the place of CSE 1102 and CSE 2100. It will be offered as a CSE 4095 Special Topics course in Spring 2016.

Catalog Description:

CSE 2050. Data Structures and Object-oriented Design
Three credits. Three class periods of lecture and one 75-minute laboratory period per week. Prerequisite: CSE 1729. Not open to students who have passed CSE 2100.
An introduction to fundamental data structures and algorithms. The emphasis is on understanding how to efficiently implement different data structures, communicate clearly about design decisions, and understand the relationships among implementations, design decisions, and the four pillars of object-oriented programming—abstraction, encapsulation, inheritance, and polymorphism.

Syllabus:

Course Topics
1. Object-oriented design principles
2. Stacks, queues, and lists
3. Binary search trees
4. Priority queues
5. Tries
6. Directed and undirected graphs
7. Searching and sorting
8. Maps and hashing

Labs
There is a mandatory laboratory each week. Labs will have associated assigned tasks that are due the day of the lab.

Homework
There will be a number of programming assignments throughout the semester. These will be submitted electronically; no late assignments will be accepted.

Exams
There will be one midterm and one final exam. These will be given in class and will be cumulative (i.e. everything we covered at the time of the test may appear on the test).

Grades
Grades will be computed on a 100 point scale as follows.

- 10 Lab assignments and participation
- 40 Programming assignments
- 20 Midterm
- 30 Final
Prerequisite change, CSE 3666

CSE 3666, Introduction to Computer Architecture has prerequisites of CSE 2100 and 2300W. We would like to remove CSE 2300W as a prerequisite so CSE 3666 has the same prerequisites as CSE 2304, Computer Architecture. The two courses are essentially the same, so we will be able to cross-list them for a time, then ultimately stop offering CSE 3666.

Current catalog listing, proposed removal in italics:

CSE 3666. Introduction to Computer Architecture
Three credits. Three 1-hour lectures and one 1-hour laboratory period. Prerequisite: 2100 and 2300W. Cannot be taken after CSE 4302 or 4901. This course and CSE 2304 may not both be taken for credit. This course and CSE 243 may not both be taken for credit.
Structure and operation of digital systems and computers. Machine organization, control and data paths, instruction sets, and addressing modes. Integer and floating-point arithmetic, the memory hierarchy, the I/O subsystem. Assembly language and basic program organization, interrupts, I/O, and memory allocation.

Remove credit restriction, CSE 2304

CSE 2304 has a credit restriction, "Not open to students who have credit for CSE 207 or CSE 241 or CSE 2300W." We would like to remove CSE 2300W from that list of restricted courses.
This, plus the previous change, would allow CSE 2304 and CSE 3666 to be the same course.

Current catalog listing, proposed removal in italics:

CSE 2304. Computer Architecture
Three credits. Prerequisite: CSE 2100 and 2500. Not open to students who have credit for CSE 207 or CSE 241 or CSE 2300W.
Structure and operation of digital systems and computers. Fundamentals of digital logic. Machine organization, control and data paths, instruction sets, and addressing modes. Hardwired and microprogrammed control. Memory systems organization. Discussion of alternative architectures such as RISC, CICS, and various parallel architectures.

Change prerequisite and remove credit restriction, CSE 1729

CSE 1729 currently has no prerequisites, and cannot be taken for credit after taking CSE 1010. We would like to make CSE 1010 a prerequisite for CSE 1729 based on our experience with underprepared students. Since these will be taken in sequence, we can cut the language comparing CSE 1010 and CSE 1729.

Current catalog listing:

CSE 1729. Introduction to Principles of Programming
Three credits. Two 1-hour lectures and one 2-hour laboratory. Not open for credit to students who have passed CSE 110, 123, 1100, or 1010. CSE 1729 may be used in place of CSE 1010 to fulfill any requirement fulfilled by CSE 1010.
An introduction to computer programming in a structured programming language including fundamental elements of program design and analysis. Data and functional abstraction as tools for constructing correct, efficient, and intelligible programs for a variety of common computing problems. While this course covers the material in CSE 1010, its focus on abstraction makes it appropriate for students seeking a deeper understanding of computing fundamentals as well as those planning on continued study in computing.

Proposed catalog listing:

CSE 1729. Introduction to Principles of Programming
Three credits. Two 1-hour lectures and one 2-hour laboratory. Prerequisite: CSE 1010. CSE 1729 may be used in place of CSE 1010 to fulfill any requirement fulfilled by CSE 1010.
An introduction to computer programming in a structured programming language including fundamental elements of program design and analysis. Data and functional abstraction as tools for constructing correct, efficient, and intelligible programs for a variety of common computing problems.
Prerequisite change, CSE 4300

We would like to change the prerequisites for CSE 4300 Operating Systems from “CSE 2102 and CSE 2304 or 3666” to “CSE 2102 or CSE 3100 and CSE 2304 or 3666”. CSE 3100, Systems Programming, is a more appropriate prerequisite than CSE 2102, Software Engineering; leaving both possibilities gives us more flexibility as CSE 3100 has not been a required course in the CS and CSE degrees.

Proposed catalog listing, additions in bold italic:

4300. Operating Systems
Three credits. Prerequisite: CSE 2102 or 3100; CSE 2304 or 3666; open only to students in the School of Engineering.
Introduction to the theory, design, and implementation of software systems to support the management of computing resources. Topics include the synchronization of concurrent processes, memory management, processor management, scheduling, device management, file systems, and protection.

Prerequisite changes relating to CSE 2304 and 3666

There are a three courses that have CSE 3666 but not CSE 2304 as prerequisite; we will change these to have CSE 2304 or CSE 3666 as prerequisite to reflect the changes to CSE 2304 or CSE 3666 above. This affects CSE 4100 (Programming Language Translation), CSE 4302 (Computer Organization and Architecture), and CSE 4709 (Networked Embedded Systems).

Prerequisite changes relating to CSE 2050

Since CSE 2050 will replace CSE 2100, we need to update all courses having CSE 2100 as a prerequisite to include CSE 2050 or 2100. This affects the following courses: CSE 2102, 2304, 3100, 3500, 3502, 3504, and 3666.

Prerequisite changes relating to CSE 1729

Since CSE 1729 will take CSE 1102's place in the curriculum, we need to update the prerequisite of CSE 2500 (Discrete Structures) from CSE 1102 to CSE 1102 or CSE 1729.

Editorial change, CSE 4705

Remove reference to programming in Lisp from CSE 4705, to reflect the way the course has been taught in recent years.

Current catalog listing, text to remove in italics:

CSE 4705. Artificial Intelligence
Three credits. Prerequisite: CSE 3500; open only to students in the School of Engineering.
Design and implementation of intelligent systems, in areas such as natural language processing, expert reasoning, planning, robotics, problem solving and learning. Students will design their own versions of "classic" AI problems, and complete one substantial design project. Programming will be done primarily in Lisp, which will be covered briefly at the beginning of the course.
1010. Introduction to Computing for Engineers

Three credits. Two 1-hour lectures and one 2-hour laboratory. Not open for credit to students who have passed CSE 110 or 1100 or 1729.

Introduction to computing logic, algorithmic thinking, computing processes, a programming language and computing environment. Knowledge obtained in this course enables use of the computer as an instrument to solve computing problems. Representative problems from science, mathematics, and engineering will be solved.

1102. Object Oriented Design and Programming

Three credits. Three class periods of lecture and one 75-minute laboratory period per week. Prerequisite: CSE 1100 or 1010 or 1729. Not open to students who have passed CSE 124C.


1729. Introduction to Principles of Programming

Three credits. Two 1-hour lectures and one 2-hour laboratory. Prerequisite: CSE 1010. Not open for credit to students who have passed CSE 110, 123, 1100, or 1010. CSE 1729 may be used in place of CSE 1010 to fulfill any requirement fulfilled by CSE 1010.

An introduction to computer programming in a structured programming language including fundamental elements of program design and analysis. Data and functional abstraction as tools for constructing correct, efficient, and intelligible programs for a variety of common computing problems. While this course covers the material in CSE 1010, its focus on abstraction makes it appropriate for students seeking a deeper understanding of computing fundamentals as well as those planning on continued study in computing.

2050. Data Structures and Object-oriented Design

Three credits. Three class periods of lecture and one 75-minute laboratory period per week. Prerequisite: CSE 1729. Not open to students who have passed CSE 2100.

An introduction to fundamental data structures and algorithms. The emphasis is on understanding how to efficiently implement different data structures, communicate clearly about design decisions, and understand the relationships among implementations, design decisions, and the four pillars of object-oriented programming--abstraction, encapsulation, inheritance, and polymorphism.
2102. Introduction to Software Engineering

Three credits. Three class periods and one problem session. Prerequisite: CSE 2100 or 2050, and CSE 2500; CSE 2500 may be taken concurrently.

Software engineering concepts including the software life cycle and other software-development process models. Specification techniques, design methodologies, performance analysis, and verification techniques. Team-oriented software design and development, and project management techniques. Use of appropriate design and debugging tools for a modern programming language. Homework and laboratory projects that emphasize design and the use/features of a modern programming language.

2300W. Digital Logic Design

Four credits. Three class periods and one 2-hour laboratory period. Prerequisite: CSE 1010 or 1100 or 1729 or 1102 and secondary school physics or PHYS 1010 or 1501; ENGL 1010 or 1011 or 2011. Not open to students who have passed CSE 207.

Representation of digital information. Analysis, design, and evaluation of combinational and sequential logic circuits. Debugging techniques. Use of computer facilities for circuit simulation, CAD, and report preparation and presentation.

2304. Computer Architecture

Three credits. Prerequisite: CSE 2100 or 2050, and 2500. Not open to students who have credit for CSE 207 or CSE 241 or CSE 2300W.

Structure and operation of digital systems and computers. Fundamentals of digital logic. Machine organization, control and data paths, instruction sets, and addressing modes. Hardwired and microprogrammed control. Memory systems organization. Discussion of alternative architectures such as RISC, CISC, and various parallel architectures.

2500. Introduction to Discrete Systems

Three credits. Prerequisite: CSE 1102 or 1729. Mathematical methods for characterizing and analyzing discrete systems. Modern algebraic concepts, logic theory, set theory, grammars and formal languages, and graph theory. Application to the analysis of computer systems and computational structures.

3100. Systems Programming

Three credits. Two 1-hour lectures and one 2-hour laboratory per week. Prerequisite: CSE 2050 or 2100.

Introduction to system-level programming with an emphasis on C programming, process management, and small scale concurrency with multi-threaded programming. Special attention will be devoted to proficiency with memory management and debugging facilities both in a sequential and parallel setting.

3500. Algorithms and Complexity

Three credits. Three class periods. Prerequisite: CSE 2050 or 2100, and CSE 2500.

3502. Theory of Computation

Three credits. Prerequisite: CSE 2050 or 2100, and CSE 2500.

Formal models of computation, such as finite state automata, pushdown automata, and Turing machines, and their corresponding elements in formal languages (regular, context-free, recursively enumerable). The complexity hierarchy. Church's thesis and undecidability. NP completeness. Theoretical basis of design and compiler construction.

3504. Probabilistic Performance Analysis of Computer Systems

Three credits. Prerequisite: CSE 2050 or 2100, and CSE 2500; and one of STAT 3025Q or 3345Q or 3375Q or MATH 3160.

Introduction to the probabilistic techniques which can be used to represent random processes in computer systems. Markov processes, generating functions and their application to performance analysis. Models which can be used to describe the probabilistic performance of digital systems.

3666. Introduction to Computer Architecture

Three credits. Three 1-hour lectures and one 1-hour laboratory period. Prerequisite: CSE 2050 or 2100 and 2300W. Cannot be taken after CSE 4302 or 4901. This course and CSE 2304 may not both be taken for credit. This course and CSE 243 may not both be taken for credit.

Structure and operation of digital systems and computers. Machine organization, control and data paths, instruction sets, and addressing modes. Integer and floating-point arithmetic, the memory hierarchy, the I/O subsystem. Assembly language and basic program organization, interrupts, I/O, and memory allocation.

3800. Bioinformatics

(Also offered as BME 4800.) Three credits. Prerequisite: BIOL 1107, CSE 1100 or 1010 or 1729, and either STAT 3025Q or STAT 3345Q.

Fundamental mathematical models and computational techniques in bioinformatics. Exact and approximate string matching, suffix trees, pairwise and multiple sequence alignment, Markov chains and hidden Markov models. Applications to sequence analysis, gene finding, database search, phylogenetic tree reconstruction.


(Also offered as ECE 3431.) Three credits. Prerequisite: CSE 1100 or 1010 or 1729, and MATH 2110Q and 2410Q; open only to students in the School of Engineering. Prerequisite or corequisite: MATH 2210Q.

Introduction to the numerical algorithms fundamental to scientific computation. Equation solving, function approximation, integration, difference and
differential equations, special computer techniques. Emphasis is placed on efficient use of computers to optimize speed and accuracy in numerical computations. Extensive digital computer usage for algorithm verification.

3810. Computational Genomics (Also offered as BME 3810.) Three credits. Prerequisite: BIOL 1107, CSE 1010 or 1100 or 1729, and either STAT 3025Q or 3345Q.

Computational methods for genomic data analysis. Topics covered include statistical modeling of biological sequences, probabilistic models of DNA and protein evolution, expectation maximization and Gibbs sampling algorithms, genomic sequence variation, and applications in genomics and genetic epidemiology.

4100. Programming Language Translation

Three credits. Prerequisite: CSE 2102 and 3502 and either CSE 2304 or 3666; open only to students in the School of Engineering.

Introduction to the formal definition of programming language syntax and semantics. Design and realization of programming language processing systems such as assemblers, compilers, and interpreters.

4300. Operating Systems

Three credits. Prerequisite: CSE 2102 or 3100; CSE 2304 or 3666; open only to students in the School of Engineering.

Introduction to the theory, design, and implementation of software systems to support the management of computing resources. Topics include the synchronization of concurrent processes, memory management, processor management, scheduling, device management, file systems, and protection.

4302. Computer Organization and Architecture

Three credits. Three 1-hour lectures. Prerequisite: CSE 2300W; CSE 2304 or 3666; open only to students in the School of Engineering. This course and CSE 243 may not both be taken for credit. Cannot be taken after CSE 4901.

Organization and architecture of modern computer systems. Emphasis is on alternatives and advances to the basic Von Neumann architecture: topics such as pipelining, memory hierarchy and management, multiprocessor and alternative architectures, reconfigurable hardware, and other techniques for performance enhancement.

CSE 4704. Computational Geometry

Three credits. Prerequisite: CSE 3500; open only to students in the School of Engineering.

An extension of sorting, searching, selection, and graph algorithms to geometric problems. This includes algorithms and data structures for constructing geometric objects, computing geometric properties, and answering geometric queries as well as techniques for the analysis of their correctness and complexity.

4705. Artificial Intelligence
Three credits. Prerequisite: CSE 3500; open only to students in the School of Engineering.

Design and implementation of intelligent systems, in areas such as natural language processing, expert reasoning, planning, robotics, problem solving and learning. Students will design their own versions of "classic" AI problems, and complete one substantial design project. Programming will be done primarily in Lisp, which will be covered briefly at the beginning of the course.

4709. Networked Embedded Systems

Three credits. Prerequisite: CSE 2300W, 2304 or 3666, and CSE 3300 or equivalent with permission of the instructor; open only to students in the School of Engineering.

Introduction to the basic concepts, challenges, and methods for designing networked embedded systems. Examines related hardware, software, and system-level design. Hardware topics include various design alternatives (such as microcontrollers, digital signal processors (DSP), and field-programmable gate array (FPGA)) in resource-constrained environments. Software issues include operating systems, programming languages, program verification and analysis. System-level topics include autonomous wireless sensor network design, power and resource management, security and privacy.
Electrical & Computer Engineering Course & Curriculum:

Changes in the CMPE course sequence
Approved by ECE C&C 10/27, CSE C&C 10/28, ECE faculty 10/29

Revisions, changes, and introduction of a new course in the CSE program warranted changes in the CMPE course sequence as follows:

i) Replace CSE 1102 (Object Oriented Design and Programming) with CSE 1729 (Introduction to Principles of Programming)

ii) Replace CSE 2100 (Data Structures and Introduction to Algorithms) with the new course CSE 2050 (Data Structure and Object-Oriented Design)

iii) Add CSE 3100 to the Professional Requirements course listing for CMPE.

Engineering (ENGR) Course & Curriculum

Proposal to Add a New Undergraduate Course
Last revised: September 24, 2013

1. Date: October 2, 2015
2. Department requesting this course: Engineering
3. Semester and year in which course will be first offered: Fall 2016

Final Catalog Listing

ENGR 3257. Assessment for Human Rights and Sustainability
Three credits. Co-taught with HRTS 3257.
Foundational concepts of human rights and environmental impacts pertaining to global supply chains. Regulations and voluntary standards in engineering-intensive sectors, including infrastructure, biofuels, electronics. Case study analysis of corporate assessment practices for labor rights protection and environmental impacts.

Obligatory Items

1. Standard abbreviation for Department, Program or Subject Area: ENGR
2. Course Number: 3257
3. Course Title: Assessment for Human Rights and Sustainability
4. Number of Credits: 3
5. Course Description (second paragraph of catalog entry):

Foundational concepts of human rights and environmental impacts pertaining to global supply chains. Regulations and voluntary standards in engineering-intensive sectors, including infrastructure, biofuels, electronics. Case study analysis of corporate assessment practices for labor rights protection and environmental impacts.

Optional Items

6. Pattern of instruction, if not standard:
7. Prerequisites, if applicable: None
   a. Consent of Instructor, if applicable:
   b. Open to sophomores/juniors or higher:
8. Recommended Preparation, if applicable: None
9. Exclusions, if applicable: None
10. Repetition for credit, if applicable: None
11. Skill codes “W”, “Q” or “C”:
12. S/U grading:

Justification

1. Reasons for adding this course: To broaden participation of engineering majors in human rights minor by providing contextual application of human rights concepts in technology-intensive business sectors. Course is cross-listed with HRTS 3257.
2. Academic merit: Course parallels larger trend in corporate practice of businesses co-managing labor rights and environmental standards compliance challenges associated with global supply chains. Equips students with skills base to meet growing employer demand for workers with cross-disciplinary expertise in human rights, environmental impact assessment and technology. Cross-listing between HRTS and ENGR allows students to work collaboratively on team-based projects with peers who are rarely in the same classroom. HRTS students are exposed to environmental issues in important technical business sectors and ENGR students are exposed to social impact and environmental externalities associated with production of goods designed by engineers.
3. Overlapping courses and departments consulted: No overlap with existing courses at UCONN.
4. Number of students expected: 40 (20 HRTS/ 20 ENGR)
5. Number and size of sections: 1 section with 40 students
6. Effects on other departments: Course will enhance professional practice offerings in ENGR. Course content emphasizes ‘global, societal and environmental impacts’ that are required components of capstone design. Course will complement ENGR 3315, Manufacturing 4P: People, Planet, Process and Profit. ENGR 3315 examines impacts of product design on worker safety and resource use while ENGR 3257 addresses strategies and best practices to quantitatively assess labor rights practices and environmental impacts associated with production.
7. Effects on regional campuses: None
8. Staffing: Will be co-taught by an instructor from engineering (sustainability aspects) and an instructor from Human Rights/ Political Science (labor rights aspects).

Proposer Information

1. Dates approved by
   Department Curriculum Committee:
   Department Faculty:
2. Name, Phone Number, and e-mail address of principal contact person:
   Dan Burkey
   Tel: 486-3604; Email: burkey@engr.uconn.edu
   (HRTS 3257 contact; Shareen Hertel, 486-4129, shareen.hertel@uconn.edu)
Variable Topics: Assessment for Human Rights & Sustainability

Course Description

This course explores mixed methods and techniques for evaluating the human rights impact and sustainability of various engineering outputs. Includes case study analysis of energy, infrastructure and water resources project outcomes and their impact on people and the natural environment.

Cap: 40 seats (i.e., 20 ENGR/20 HRTS)

Course Information

Instructors: Prof. Shareen Hertel
Office: 404 Oak Hall
Tel: 860-486-4129
Email: shareen.hertel@uconn.edu
Office Hours: MWF 10:30-11:30 am

Prof. Allison MacKay
Office: 314 Castleman
Tel: 860-486-2450
Email: mackaya@engr.uconn.edu
Office Hours: MW 3:45-4:45 pm

Please schedule office hours via: http://www.advapp.uconn.edu

Classes: MWF 2:30-3:20 pm, E2321

Text: No required text. Assigned articles and reports are available through HuskyCT and must be read before class to prepare for discussion. A detailed list of readings follows the course schedule below.

Course Objectives

At the end of this course, students will be able to:

1. use appropriately core concepts of human rights, sustainability and supply chains
   -exams
   -simulation/case study

2. identify major regulatory frameworks and voluntary audit standards for human rights and environmental sustainability that are used in service and industrial sectors
   -exams
   -simulation/case study

3. apply human rights and sustainability concepts and metrics in case study analysis
   -simulation/case study

4. develop fluency in reading and analysis across inter-disciplinary literatures
   -exams (using evidence from readings and case studies)
Grading Scheme

20% Midterm Exam (Oct. 10)
20% Final Exam (TBA in Final Examination period)
25% Group Case Report (written)
25% Group Case Report (oral)

Course Policies

Course attendance is essential to success. Unless a student has a medical emergency or a personal emergency documented by the Dean of Students Office, failure to be present on the day of an exam, or failure to turn in the writing assignment at the beginning of class on the day it is due, will result in a zero for that portion of the grade.

All students who enroll in this course are assumed to have read the Academic Misconduct section of the Student Conduct Code regarding plagiarism, cheating on examinations, etc. http://www.dosa.uconn.edu/student_code.html

More information about plagiarism can be found at:
http://www.irc.uconn.edu/PlagiarismModule/intro_m.htm

If there are any students in this class who have special needs because of learning disabilities or other kinds of disabilities, please discuss these with the professor within the first two weeks of class to arrange for an accommodation through the Center for Students With Disabilities.
http://www.csd.uconn.edu/
# Course Schedule

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<td>Sustainability-AM</td>
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<td>9/22</td>
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<td>Labor Rights Regulation-SH</td>
<td>Environmental Regulation-AM</td>
<td><em>UCONN Vendor Code of Conduct Climate Action Plan</em></td>
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<td>Auditors: FLA/WRCNerite-SH</td>
<td><em>Speaker</em>: Dan Viedemann from Verite</td>
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<td>ISO 14000/40/41/42-AM</td>
<td>3rd Party: LEED-AM</td>
<td><em>Speaker</em>: Karl Frey from BVH</td>
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<td>Metrics applied -how to do 3rd party evaluation-SH</td>
<td>Lifecycle Assessment -how to do it-AM</td>
<td>Midterm</td>
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<td>10/13</td>
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<td>Economic Rights: Rana Plaza, Bangladesh-SH</td>
<td>Economic rights, pt. 2-SH</td>
<td>Urban design: Baltimore-AM</td>
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<td>Renewables: Biofuels-AM</td>
<td>Clean Water-AM</td>
<td>E-Waste-AM</td>
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<td>Overview - SH</td>
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<td>10/28</td>
<td>Oct 28 - Gladstein Lecture - Sam Moyn</td>
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<td>Environmental Overview - AM</td>
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<td>No class (Gladstein lecture)</td>
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<td>In-class working session</td>
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<td>Business Sector</td>
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<td>Climate Change - AM</td>
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<td>Human Rights - SH</td>
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<td>Speaker: Praxair</td>
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<td>Speaker: TBA</td>
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<td>In-class eval; Review</td>
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<td>Final Exam TBA</td>
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**Required Readings to Prepare for Class**

*Week 1: CONCEPTUAL FOUNDATIONS of HUMAN RIGHTS*

**Monday, 8/25/14**

Class introduction -- syllabus, website and grading overview.

In-class discussion of:

Wednesday, 8/27/14


Friday, 8/29/14

In class viewing of the film Blood in the Mobile. In advance of class, please:

1) Visit the site of the International Labour Organization (ILO) "Helpdesk for Business on International Labour Standards." Available in HuskyCT under "Course Weblinks" in first section on "Essential Course Links."

2) Visit the site of the Extractives Industry Transparency Initiative on the HuskyCT page under "Websites" in the section on "Extractives Industry."

Week 2: CONCEPTUAL FOUNDATIONS of SUSTAINABILITY

Monday, 9/1/14

No Class - LABOR DAY

Wednesday, 9/3/14


J. Rockstrom, Let the Environment Guide Our Development, TED Talk, Filmed July 2010 (18:10 min), Available in HuskyCT under "Course Materials" then "Course Readings" link or http://www.ted.com/talks/johan_rockstrom_let_the_environment_guide_our_development.

C02 and climate (K12 audience, but good description):


UNEP "Freshwater Shortage"

Friday, 9/5/14


Week 3: CONCEPTUAL FOUNDATIONS of SUPPLY CHAINS

Monday, 9/8/14

Wednesday, 9/10/14

Friday, 9/12/14

Week 4: REGULATION & VOLUNTARY STANDARDS

Monday, 9/15
Labor Rights Regulation:
National standards:
In advance of class, please visit the website of the US Department of Labor, "Summary of Major Laws of US Department of Labor." Available in HuskyCT under "Course Weblinks" in first section on "Essential Course Links." Or link to it directly via: http://www.dol.gov/opa/aboutdol/lawsprog.htm
International standards:

Wednesday, 9/17
Environmental Regulation:
U.S. National Standards:
Clean Water Act: http://water.epa.gov/polwaste/npdes/
Clean Air Act: http://www.epa.gov/air/caa/peg/
Resource Recovery and Conservation Act:
http://www.law.comell.edu/wex/resource-conservation_and_recovery_act_rcra
Greenhouse Gas Reporting Initiative:

Cont'd next page
E.U. Standards:

International Standards:

Friday, 9/19

Insights from UConn's experience
   In advance of class, visit the website of the UConn President's Committee on Corporate Social Responsibility (PCCSR), which can be linked to from "Websites" section on the HuskyCT page.
   Read: excerpts from the UConn Climate Action Plan - read Section 1 & 2, skim Section 3, which is posted on the HuskyCT page under "Course Readings" (or as Weblink) -- TO FIND/UPLOAD.

Week 5: REGULATION & VOLUNTARY STANDARDS (continued)
Overview of principal labor audit standards

Monday, 9/22
Social Accountability International (SA) 8000

Wednesday, 9/24
Fair Labor Association (FLA)/Workers Rights Consortium (WRC) NERITE
Friday, 9/26
Labor rights monitoring in practice: guest lecture by Jane Hwang (Social Accountability International) ¹

In advance of class, visit the website of SAi, which can be linked to from the "Websites" section on the HuskyCT page, under "CSR Monitoring Orgs and Experts."

Week 6: REGULATION & VOLUNTARY STANDARDS (continued)
Overview of principal environmental audit standards
Monday, 9/29
ISO 14000/40/41
For general background, see "ISO Standards Background" (direct link: http://www.standards.org/standards/listing/iso_9001). Can also be linked to from the "Websites" section on the HuskyCT page, under "CSR Monitoring Orgs and Experts."

Wednesday, 10/1
LEED and other third-party environmental standards

Friday, 10/3
Environmental monitoring in practice: guest lecture by Karl Frey, P.E. (President, BVH Integrated Services)

Week 7: THE METRICS APPLIED
Monday, 10/6
Guidelines for sustainability reporting [Alison - this reading may be too technical]

Wednesday 10/8
Life-Cycle Analysis (LCA)
Friday, 10/10
MIDTERM EXAM

Week 8: SECTOR ANALYSIS THROUGH CASE STUDIES
Monday, 10/13
Economic Rights Sample Case Study: Rana Plaza (Bangladesh) garment factory disaster of 2013.
In advance of class, review the comprehensive coverage of this event provided by the Business & Human Rights Resource Centre (London/New York). Available in HuskyCT under "Course Weblinks" in section on "CSR Monitoring Organizations & Experts." Or link directly at http://business-humanrights.org/en/rana-plaza-building-collapse-april-2013

Wednesday, 10/15
Economic Rights sample case study, part 2

Friday, 10/17
Sustainability case study, Baltimore LTER

Week 9: SECTOR ANALYSIS THROUGH CASE STUDIES (continued)
Monday, 10/20
Renewables: Biofuel

Wednesday, 10/22
Clean Water

Friday, 10/24
E-waste

Week 10: TEAM-BASED PROJECT IMPACT ASSESSMENTS (Overview and pedagogy)
Monday, 10/27

Tuesday, 10/28
Mandatory attendance at the Gladstein Lecture on Human Rights by Prof. Samuel Moyn (Harvard), on "Future of Human Rights" -- 4 p.m. Dodd Center ·

Wednesday, 10/29
NEED TO ADD PEDAGOGY READING ON ENVIRONMENTAL ASSESSMENT

Friday, 10/31
Class cancelled because of Gladstein Lecture
Week 11: TEAM-BASED PROJECT IMPACT ASSESSMENTS (Research and Preparation)
Monday, 11/3

Wednesday, 11/5
Team meetings with Profs. Hertel and MacKay (sign up for timeslots; bring progress reports)

Friday, 11/7
In-class working session [Is there an environmental "check-list" or other tool we could use to facilitate this session??]

Week 12: PUBLIC PRESENTATIONS OF PROJECT IMPACT ASSESSMENTS
Monday, 11/10
Groups 1, 2

Wednesday, 11/12
Groups 3, 4

Friday, 11/14
Groups 5, 6

Week 13: MACRO-LEVEL POLICY IMPLICATIONS
Monday, 11/17
Climate change. Read the UN Global Compact's "Guide for Responsible Corporate Engagement in Climate Policy" (2013). Available on HuskyCT under "Course Readings."

Wednesday, 11/19

Friday, 11/21
Review the website of Net Impact, a major clearinghouse for employment info in the sustainability and social change fields (see https://netimpact.org/ -- link also available in HuskyCT "Course Weblinks" section on "CSR Monitoring Organizations & Experts."
Read Net Impact 2011 "Corporate Careers that Make a Difference" report (https://netimpact.org/research-and-publications/comorate-careers-that-make-a-difference) -- also available as a PDF in HuskyCT "Course Readings."
Boston College Center for Corporate Citizenship's 2013 *Profile of the Professionals* report (http://www.bcccc.net/index.cfm?pageld=2199) available in HuskyCT as PDF under "Course Readings."
**Week 14: PROFESSIONAL & RESEARCH FRONTIERS**

**Monday, 12/1**

*David Strauss, VP for Safety, Health & Environment at Praxair*


**Wednesday, 12/3**

*Invited Speaker*

**Friday, 12/5**

In-class evaluation and final review

**Week 15: FINAL EXAMS**

FINAL EXAM - date/time to be announced

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1 Hwang is SAi's Director of Corporate Programs and Training. She oversees SAi's global capacity building programs, which include training and technical assistance, corporate advisory services, strategic initiatives, and public-private partnerships. Hwang manages program teams at SAi HQ as well as international staff and representative offices in China, India, Brazil and elsewhere. She is the co-creator of SAi's Social Fingerprint® program for improving management systems and social performance. Hwang has co-authored several publications on environmental and social management systems, responsible supply chains, and UN Guiding Principles, and served on several global working groups. She earned her B.A. and M.B.A from Columbia University.

2 Strauss is vice president of safety, health and environment, for Praxair, Inc. since April 1, 2013. David holds a BS degree in electrical engineering, a BA degree in psychology and a Masters degree from Columbia University in Management Science & industrial management. David joined Praxair in 1990 holding positions of increasing responsibility in the electronics materials business including general manager of North America, vice president of operations and prior to his current position managing director of Electronic Materials a global business focused on manufacturing and selling high purity metals and ceramics to the electronics industry.
Proposed Modifications to Manufacturing Minor:

Core Classes:

ENGR 2215 – 3 credits: Principles of Manufacturing Engineering:
This course is an introduction to engineering aspects of modern manufacturing processes and systems with a focus on creating products on a commercial scale through conversion of material into components and components into products. The students will also benefit from a number of case studies related to these processes. Topics include: casting, forming & shaping, cutting, machining, joining, surface engineering, optical materials engineering, additive manufacturing, computer-integrated manufacturing, automation, & special manufacturing processes, such as chemical and biological systems.

ENGR 3215 – 3 credits: Statistical Quality Control and Reliability for Manufacturing:
This course will cover the foundation of quality control and reliability in manufacturing systems. Topics covered includes: Introduction to probability and statistics; Principle and methods of modern quality control in manufacturing; Six Sigma; Control charts for measurement and attribute data; Development and utilization of control charts; Manufacturing process capability studies; ANOVA and linear regression of measurement data; Experimental design; Response surface and Taguchi methodology; Acceptance sampling; Reliability prediction and modelling in manufacturing systems. Prereq: MATH 2110, Junior Standing

Elective Classes: Students select nine (9) credits of Manufacturing-related classes relevant to their specific interests.

MEM:
- 3221: Introduction to Products and Processes Prereq: MEM 2211
- 4225: Advanced Products and Processes Prereq: MEM 3221

ME:
- 3217: Metal Cutting Principles Prereq: CE 3110 (Mechanics of Materials)
- 3221: Manufacturing Automation Prereq: Instructor Consent
- 3222: Production Engineering Prereq: Instructor Consent
- 3225: CAD, Modeling & Graphics Prereq: CSE 1010, CE 3110, Math 2110
- 3295: Principles of Machining and Machine Tools

MSE:
- 2101: Materials Science and Engineering I Prereq: CHEM 1127
- 2102: Materials Science and Engineering II Prereq: MSE 2101 or 2001
- 3004: Mechanical Behavior of Materials Prereq: MSE 2101
- 4004: Thermal/Mechanical Processing of Materials Prereq: MSE 3004
- 4040: Material Selection in Mechanical Design Prereq: MSE 3004
ENGR2215

Principles of Manufacturing Engineering

Course Description: This course is an introduction to engineering aspects of modern manufacturing processes and systems with a focus on creating products on a commercial scale through conversion of material into components and components into products. The students will also benefit from a number of case studies related to these processes.

- 1 week: Introduction to Manufacturing Processes and systems
- 1 week: Casting
- 2 weeks: Forming and shaping
- 2 weeks: Cutting and machining
- 1 week: Joining
- 1 week: Surface Engineering
- 1 week: Optical Materials Engineering
- 1 week: Additive manufacturing
- 1 week: Brief introduction to Biological and Chemical Manufacturing
- 1 week: computer-integrated manufacturing and automation
- 1 week: Case studies

Learning Outcomes:

1. Understand the fundamentals of manufacturing and manufacturing processes;
2. Understand manufacturing processes common processes in manufacturing;
3. Understand aspects of surface engineering and optical materials engineering;
4. Understand the core principles of manufacturing and product realization;
5. Understand the tools and methods for analysis, design, and operation of manufacturing systems;

Textbook

References:

Grading: There are five components in the determination of the final grade. These are homework, two exams, final exam, and the project.

Exams/Quizzes: There are two 1 hour 15 minute exams and final exam also of an hour and 15 minutes, which may consist of a combination of multiple choices, short problems, and longer computational problems. An absence on an exam/quiz day results in a zero for that exam. Make-up exams will be given only for officially documented medical reasons, and the student is expected to contact the instructor in such cases before the scheduled exam day. The dates of these exams appear on the course schedule sheet.
Your final grade for the Course will be determined by:

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<th>Topic</th>
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<tr>
<td>Homework/Class Participation/ Quizzes: (See Note about HW format)</td>
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<tr>
<td>Exam #1</td>
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<tr>
<td>Exam #2</td>
<td>20%</td>
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<td>Exam #3</td>
<td>30%</td>
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<tr>
<td>Project (20% Report +10% Presentation PPT)</td>
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<td>Total:</td>
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*Academic Integrity Student Code*

The MEM faculties strongly believe that academic integrity is a cornerstone in the educational process. All students should familiarize themselves with the rules and regulations found in the student code [http://www.nos.uconn.edu/student_code.html](http://www.nos.uconn.edu/student_code.html). Please note:

*fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgement of the research and ideas of others. Misrepresenting someone else's work as one's own is a serious offense in any academic setting and it will not be condoned*

Academic misconduct includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation (e.g., papers, projects, and examinations); any attempt to influence improperly (e.g., bribery, threats) any member of the faculty, staff, or administration of the University in any matter pertaining to academics or research; presenting, as one's own, the ideas or words of another for academic evaluation; doing unauthorized academic work for which another person will receive credit or be evaluated; and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved.

*A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation, and shall be subject to the sanctions and other remedies described in The Student Code."

(Student code Appendix A section B.- Conduct Rules and Regulation item 1 - Violation of the Academic Integrity in Undergraduate Education and Research.)

*Please also note that if Religious observances prohibit you from participating in any required activities such as exams, please let instructors know at least one week in advance so alternative arrangements can be made.*
Proposal to Add a New Course:

ENGR 3215 Statistical Quality Control and Reliability for Manufacturing

Liang Zhang
(860-486-4462, ITEB333, liang@engr.uconn.edu)

Catalog description: Principle and methods of modern quality control; Six Sigma; Control charts for measurement and attribute data; Development and utilization of control charts; Process capability studies; ANOVA and linear regression of measurement data; Experimental design; Response surface and Taguchi methodology; Acceptance sampling; Reliability prediction and modelling.

Pre-requisites: Junior standing, MATH 2110.

Number of Credits: 3 Grading Basis: Graded

Course objective: Quality and reliability and two of the most important components in manufacturing. The goal of this course is to present the theory and methods of modern statistical quality control and reliability analysis with applications in manufacturing. The course will cover the underlying statistical and probability theory techniques. In addition to manufacturing, applications in health care, service, pharmaceuticals, software engineering, etc., will be discussed. Topics in this course include: Six Sigma, development and utilization of control charts for measurement and attribute data, process capability studies, ANOVA and linear regression of measurement data, experimental design, response surface, Taguchi methodology, acceptance sampling, and reliability prediction and modelling.

After completing the course, the students are expected to obtain:

- Understanding of the concepts and methods of statistical quality control.
- Understanding of professional and ethical responsibility related to quality and reliability.
- The ability to design and implement the DMAIC (define, measure, analyze, improve, and control) process for Six Sigma activities.
- The ability to design, use, and interpret control charts for variables and attributes.
- The ability to perform process capability analysis.
- The ability to apply statistical experimental design methods to evaluate and compare design configurations and alternatives and determine key parameters that impact performance.
- The ability to derive probabilistic reliability models and evaluate system risk and reliability.
- The ability to apply computerized tools in quality and reliability studies.


Other References:

Homework: Homework sets will be assigned weekly and are due in class the following week.

Exams: The course includes two midterm exams and a final exam.
The following are changes were put forward for approval and passed by the MEM faculty 9/25/15.

Motion 1: Clarify catalog language regarding Technical Elective credit

Current Language:

Required Courses

MEM majors are required to complete the following: ACCT 2001, 2101; BLAW 3175; CE 2110** and 3110; CSE 1100 or 1010**; ECE 2000; ENGR 1000**; FNCE 3101; ME 2233, 3221, 3227, and 3263; MEM 1151, 2211, 2212, 3221, 3231, 4225, and 4971W and 4972W; MGMT 3101 and 4900; MKTG 3101; MSE 2001 or 2101, 2102; OPIM 3652, 3801; Technical Electives courses (6 credits).

OPIM 3104 may not be used to fulfill business-elective credit by MEM majors.

The Technical Electives must be 3000-4000-level or higher courses from departments listed in the School of Business and the School of Engineering as specified in the Management and Engineering for Manufacturing Guide to Course Selection. At least three of the credits must be from courses in engineering.

MEM students who have completed CSE 1010 or 1100 will not be required to take OPIM 3103 and will satisfy the requirements for courses that will have OPIM 3103 as a requisite.

Revised Language, changes underlined:

Required Courses

MEM majors are required to complete the following: ACCT 2001, 2101; BLAW 3175; CE 2110** and 3110; CSE 1100 or 1010**; ECE 2000; ENGR 1000**; FNCE 3101; ME 2233, 3221, 3227, and 3263; MEM 1151, 2211, 2212, 3221, 3231, 4225, and 4971W and 4972W; MGMT 3101 and 4900; MKTG 3101; MSE 2001 or 2101, 2102; OPIM 3652, 3801; a Business Technical Elective course (3 credits); an Engineering Technical Elective course (3 credits).

Neither OPIM 3103 nor OPIM 3104 may be used to fulfill business-elective credit by MEM majors. ME 3222 may not be used to fulfill engineering-elective credit by MEM majors.

The Business Technical Elective must be from a 3000-4000-level or higher course from one of the five departments listed in the School of Business: ACCT, FNCE, MGMT, MKTG, or OPIM.

The Engineering Technical Elective must be from a 3000-4000-level or higher course from the School of Engineering, or from the following list of courses from Allied Health: AH 3570, AH 3574 or AH 3270.

MEM students who have completed CSE 1010 or 1100 will not be required to take OPIM 3103 and will satisfy the requirements for courses that will have OPIM 3103 as a requisite.

Rationale: This new language provides further details on the intended elective content. Because OPIM 3103 could previously be waived as a prerequisite if computer skills were demonstrated in CSE 1010 or 1000, it is appropriate to disallow it as an elective due to content overlap. Since ME 3222 has been removed from the MEM curriculum due to overlap with MEM core courses, it is appropriate to disallow it as an elective.

Motion 2: Introduce a new course listing, Senior Design for Visiting International Students.
MEM 4977 Senior Design for Visiting International Students.

Three Credits. Prerequisites: Open only to visiting international students subject to prior approval of the MEM Co-directors. Not open to UConn Students.

A one-semester version of the capstone design course for the MEM Program. Both written and oral reports are required. Students will work on an engineering design project focused on product/process creation or improvement, including problem definition, background, and proposed solutions, followed by fabrication or implementation and testing to meet a detailed specification of engineering requirements.

Rationale: In 2015-2016 MEM moved to a new two-semester Senior Design experience via MEM 4971W and MEM 4972W. Visiting students from Lund University in Sweden had typically taken the one-semester predecessor (MEM 4915W) each Spring, and Lund administration has requested a one-semester replacement. The standing agreement involves Lund students participating remotely on project preliminaries in the Fall semester for no credit, in order to stay abreast of project scope prior to their arrival. This will continue to be the plan going forward, though the catalog language leaves open other possibilities, such as an independent standalone project taking place entirely in the Spring (but not involving UConn teammates.) Total credit hours have been reduced by one credit hour to reflect that some Business case-study material from MEM 4971W will not be duplicated in the Spring.

Motion 3: Remove MSE 2001 as an MEM required course.

Rationale: Not open to MEM students. Catalog had said “MSE 2001, or MSE 2101, 2102” to include the substitution of transfer students.

Motion 4: Merge catalog contents into a single major program catalog listing, meeting the requirements of both schools.

Rationale: Navigating a listing of University Majors finds two listings for MEM, one for Business, and one for Engineering. This causes confusion (including the ABET evaluators) that there are two distinct major programs. Additionally, having different presentations of the same material causes confusion.