

## CIVIL ENGINEERING COURSE SYLLABI LIST

#	Course No	Course Name
1	CCEN-101	<i>Introduction to Engineering</i>
2	MECH-105	<i>Computer Aided Graphics</i>
3	CVEN-201	<i>Engineering Mechanics-I</i>
4	CVEN-202	<i>Engineering Mechanics-II</i>
5	CVEN-206	<i>Mechanics of Solids Lec</i>
6	CVEN-207	<i>Mechanics of Solids Lab</i>
7	MECH-208	<i>Thermodynamics</i>
8	CVEN-308	<i>Applied Numerical Analysis for Engineers</i>
9	CVEN-311	<i>Theory of Structures Lec</i>
10	CVEN-312	<i>Design of Steel Structures</i>
11	CVEN-313	<i>Theory of Structures Lab</i>
12	CVEN-325	<i>Hydrology and Hydraulics Lec</i>
13	CVEN-327	<i>Hydrology and Hydraulics Lab</i>
14	CVEN-331	<i>Principles of Geotechnical Engineering Lec</i>
15	CVEN-332	<i>Principles of Geotechnical Engineering Lab</i>
16	CVEN-352	<i>CE Materials Lec</i>
17	CVEN-354	<i>CE Materials Lab</i>
18	MECH-406	<i>Engineering Economics</i>
19	CVEN-419	<i>Design of Concrete Structures</i>
20	CVEN-435	<i>Foundation Design</i>
21	CVEN-442	<i>Water Resources Engineering</i>
22	CVEN-452	<i>Urban Transportation Systems Design</i>
23	CVEN-454	<i>Traffic Engineering</i>
24	CVEN-464	<i>Engineering Ethics and Professional Practice</i>
25	CVEN-475	<i>Project Planning and Scheduling</i>
26	CVEN-476	<i>Construction Project Management</i>
27	CVEN-491	<i>CE Senior Project – I</i>
28	CVEN-492	<i>CE Senior Project -II</i>

**FOLLOWING PART IS COMMON TO ALL COURSE SYLLABI  
GUIDELINES ABOUT THE COURSE AND UNIVERSITY POLICIES IS APPENDED  
AT THE END OF THE COURSE SYLLABI**

- Civil Engineering Students must adhere to the UDC's Conduct Code. Each student is expected to work independently on all exams including the take-home exams. Students may neither give nor receive assistance on examinations. All written material, including homework, term papers, reports, projects, etc. must be the student's original work. The bounds of original work and the degree of collaboration that will be allowed in the class will be established by the instructor. The work of others may be used with proper reference or acknowledgment.
- Attendance is expected at all class sessions. When an absence is expected, the instructor should be notified as soon as possible either by phone or e-mail.
- Missed exams may be made up at the discretion of the instructor.
- Late home assignments may be accepted only when approved prior to the due date.
- Schedule of exams will be on the ISCL (Instructor-Student Communication Leaflet) which will be distributed separately. ISCL is hard copy version of the Blackboard.
- The Policies on Academic Honesty are stated in the **UDC Student Handbook** on Page-68.
- UDC is an equal opportunity Institution and supports Affirmative Action principles.
- Any student with a documented disability (physical or cognitive) who requires academic accommodations should contact the Disability Resource Center at UD at (202) 274-6000 (voice) or (202) 274-6152 (TTY for users who are deaf or hard of hearing) as soon as possible to request an official letter outlining authorized accommodations.
- For the available university services, the students with Disabilities are referred to Page-19 of the **UDC Student Handbook**.

All material is subject to change as circumstances warrant.



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Common Course**  
**FALL 2014**

**COURSE**

**SYLLABUS:** CCEN-101: Introduction to Engineering [2 Credit Hr]

**PRE/CO-REQ:** None

**COURSE TYPE:** Required Course

**CATALOG DATA:** This course introduces freshmen students interested in engineering disciplines to basic scientific principles and engineering concepts through hands-on experiments. These experiments will be designed to motivate the students to acquire the knowledge, skills and attitudes (KSAs) necessary to be successful in the pursuit of engineering disciplines. In addition, students in this course will learn how to analyze, interpret and present data using MATLAB.

**TEXT BOOK:** MATLAB, *An Introduction With Applications*, by Amos Gilat John Wiley & Sons, 4<sup>th</sup> Edition, 2011.  
*Instructor will supplement with course handouts*

**INSTRUCTORS:**

<b>Dr. Pawan Tyagi</b> Assistant Professor, Mechanical Eng. Building 42, Room 213E Email: <a href="mailto:ptyagi@udc.edu">ptyagi@udc.edu</a> Phone: (202) 274-0068	<b>Dr. Sasan Haghani</b> Assistant Professor, Electrical Eng Building 42, Room 109-H Email: <a href="mailto:shaghani@udc.edu">shaghani@udc.edu</a> Phone: (202) 274-6595
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**Dr. Lara Thompson**  
Assistant Professor, Mechanical Engineering  
Building 42 Room 213-M  
E-mail: [lara.thompson@udc.edu](mailto:lara.thompson@udc.edu)  
Phone: 202-274-5046

**OFFICE HOURS:** Open Door

**INSTRUCTIONAL FORMAT:** Classroom Lecture and Lab

**LECTURES:**

Wednesday	12:30 – 3:00 pm	42-111A or computer lab
Friday	12:30 – 3:00 pm	42-212

## **COURSE OBJECTIVES:**

The purpose of exposing the student to concepts, research ideas, and projects across various engineering disciplines, is to enable the student to choose the engineering career-path most

suitable. In order to expose the students to a wide breadth of engineering topics, the course will be co-taught by three faculty representing different branches of engineering.

## **COURSE OUTLINE:**

### ***Mechanical Engineering: Renewable Energy—Dr. Tyagi***

- Semester long project: Part (a) Write a report on “Zero Energy Home” concept in Washington DC, California, Alaska, and Central Africa  
(b) Design and build a sustainable home powered by solar energy, and energy efficient design (\*design guidelines are mentioned elsewhere in this syllabus)  
(c) Test your home under given conditions and give a presentation on your term paper
- Experiments and reports:
  - a. Solar electricity
  - b. Solar Thermal and Geothermal
  - c. Wind energy
  - d. Biomass and hydrogen fuel cell

### ***Electrical Engineering: Basic Concepts— Dr. Haghani***

- Basics of Digital Logic Design and Experiments
- Data Processing: Students in this course will learn how to analyze, interpret and present data using MATLAB. Some topics include:
  - a. basic arithmetic operations
  - b. arrays and matrices, using scripts and managing data
  - c. two and three dimensional plots
  - d. defining functions and basic programming
  - e. polynomials and curve fitting

### ***Broad Engineering—Dr. Thompson***

- Critical thinking and problem solving (some example projects below but subject to change):
  - a. Given a set of design constraints, design a container to prevent an egg from breaking when dropped two stories
  - b. Given a set of constraints, modify an existing model rocket to meet design specifications
  - c. Given a set of design constraints, design a slow sand filter to meet water filtration requirements
- Case studies/readings
- Guest lectures: to give students an overview of a wide variety of engineering applications, research, and technology

## **GRADING STANDARD:**

Attendance, in-class participation	20%	A - 90 to 100 points
Homework	20%	B - 80 to 89 points
Lab Reports	30%	C - 70 to 79 points

Group Project: presentation & report 30%

D - 60 to 69 points

F - Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Mechanical Engineering**  
**SPRING 2013**

**COURSE**

**SYLLABUS:**           **MECH-105: Computer Aided Graphics [3 Credit Hr]**

**PRE/CO-REQ:**       None

**COURSE TYPE:**     Required Course

**CATALOG DATA:** Development of skills to visualize and represent two and three dimensional objects graphically; pictorial drawing; technical drawing practices; computer aided drawing/graphics.

**TEXT BOOK:**        MasteringAutoCAD 2013 by George Omura (ISBN: 978-1-118-17407-4)  
References:    AutoCAD 2013 for Dummies by Bill Fane  
                  AutoCAD 2013 and AutoCAD LT 2013: No Experience  
                  Required by Donnie Gladfelter.

**INSTRUCTOR:**     Mr. Wilfred Lewis, CAD Professional

**OFFICE HOURS:**   M & W 11:00 AM - 12:00 PM and T 10:00 AM – 2:00 PM

**INSTRUCTIONAL FORMAT:**   Held in Computer Classroom (primarily lab format)

**LECTURES:**        Monday       11:00 AM – 12:15 PM       42/114A  
                          Wednesday 11:00 PM – 12:15 PM       42/114A

**COURSE OBJECTIVES:**

This course is designed to give engineering students the skills necessary to visualize and represent two and three-dimensional objects graphically. The objective of this self-paced course is to give the students an opportunity to obtain the ability to read, sketch and reproduce engineering drawings using AutoCAD techniques.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Graphically represent technical designs, using accepted standard practices
- Communicate graphically, using sketches and CAD
- Apply technical graphics principles to engineering disciplines
- Use the AUTODESK software for engineering drawing

**COURSE OUTLINE:**

1. Introduction to the AutoCAD Software (1 week)
2. Basic Construction Techniques (1.5 weeks)
3. Basic Editing (1 week)
4. Isometric Drawing (1.5 weeks)
5. Geometric Construction (2 weeks)
6. 2-D Orthographic Drawing (2 weeks)
7. Dimensioning (1.5 weeks)
8. Sections and Auxiliary Views (2 weeks)
9. Introduction to Solid Modeling (2 weeks)

**GRADING STANDARD:**

Homework and in-class participation	25%	A - 90 to 100 points
Exam 1	25%	B - 80 to 89 points
Exam 2	25%	C - 70 to 79 points
Exam 3	25%	D - 60 to 69 points
		F - Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** CVEN-201: Engineering Mechanics I[3 Credit Hr]

**PRE/CO-REQ:** Pre-req: PHYS-201 Physics II

**COURSE TYPE:** Required Course

**CATALOG DATA:** This course introduces students to engineering mechanics associated with non-accelerating (e.g., static) bodies. Basic principles and concepts will be learned through in-class lectures, reading assignments, homework sets and 3 in-class exams.

**TEXT BOOK:** Engineering Mechanics: Statics by R.C. Hibbler, Prentice Hall, 12th Edition, 2010.

**INSTRUCTOR:** Lara A. Thompson, Ph.D.  
Building: 42/213M, Email: [lara.thompson@udc.edu](mailto:lara.thompson@udc.edu)  
Phone: 202-274-5046

**OFFICE HOURS:** M & W 11:00 AM – 12:00 PM & T 10:00 AM – 2:00 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:**

Monday	12:30 – 1:50 PM	42/209
Wednesday	12:30 – 1:50 PM	42/209

**COURSE OBJECTIVES:**

- To utilize Newton's second law for non-accelerating bodies
- To apply the concept of the free-body diagram to derive the equilibrium equations
- To analyze two and three-dimensional systems
- To learn how to determine internal and external reaction forces and moments on particles and rigid structures in equilibrium that are subject to prescribed loads

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Apply Newton's 2nd Law for deriving the equilibrium equations
- Derive the free-body diagram (FBD)

- Calculate the forces algebraically from a system of equilibrium equations and moments using cross products
- Determine resultant force: 1) Using Parallelogram Rule (with Law of Sines and Law of Cosines) and 2) Vector Components
- Simplify force and couple systems and understanding support reactions and deriving the free-body diagram (FBD)
- Utilize Method of Sections/Method of Joints to analyze structures
- Determine Shear and Moment diagrams
- Follow logical procedures: 1) Simplifying force and couple systems, 2) assessing support reactions, 3) drawing the free-body diagram (FBD), 4) determining the equilibrium equations
- Understand basic principles of sustainable engineering practice

### **COURSE OUTLINE:**

1. Introduction and general principles (~1 week)
2. Equilibrium of Particles (~2 weeks)
3. Force Systems and Equilibrium of Rigid Bodies (~2.5 weeks)
4. Internal Forces and Moments (~2.5 weeks)
5. Structures (~ 2.5 weeks)
6. Friction (~ 0.5 weeks)
7. Method of Virtual Work (~0.5 weeks)
8. Centroids, centers of gravity, and moments of inertia (~ 2 weeks)
9. Examinations (1 week)

### **GRADING STANDARD:**

Homework and in-class participation	25%	A - 90 to 100 points
Exam 1	25%	B - 80 to 89 points
Exam 2	25%	C - 70 to 79 points
Exam 3	25%	D - 60 to 69 points
		F - Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:** CVEN-202: Engineering Mechanics II [3 Credit Hr]

**PRE/CO-REQ:** Pre-req: CVEN-201 Engineering Mechanics I

**COURSE TYPE:** Required Course

**CATALOG DATA:** Covers kinematics and kinetics of a particle. Planar kinematics of a rigid body; planar kinetics of a rigid body including force and acceleration; work and acceleration; work and energy; impulse and momentum, and vibrations.

**TEXT BOOK:** Engineering Mechanics: Dynamics by R.C. Hibbler, Prentice Hall, 12th Edition, 2010.

**INSTRUCTOR:** Lara A. Thompson, Ph.D.  
Building: 42/213M, Email: [lara.thompson@udc.edu](mailto:lara.thompson@udc.edu)  
Phone: 202-274-5046

**OFFICE HOURS:** Tues. & Thurs. 11:00 AM - 12:30 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:**

Tuesday	2:00 – 3:20 PM	42/209
Thursday	2:00 – 3:20 PM	42/209

**COURSE OBJECTIVES:**

- To utilize Newton's second law for accelerating bodies.
- To apply the concept of the free-body diagram to derive the equilibrium equations.
- To analyze kinematics and kinetics of two and three-dimensional systems

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Apply knowledge of mathematics to obtain solutions for motion of particles and rigid bodies (kinematics).
- Demonstrate knowledge of Newton's second law for particles and rigid bodies in motion (kinetics)
- Drawing the free-body diagram (FBD) and deriving the equations of motion
- Apply work-energy concepts as well as and impulse and momentum concepts

**COURSE OUTLINE:**

1. Introduction and General Principles (~1 week)
2. Kinematics of particles in rectangular, normal-tangential, and polar coordinates (~2 weeks)
3. Kinetics of particles (i.e., utilizing free-body diagrams to derive the equations of motion) (~2.5 weeks)
4. Kinematics of rigid bodies for translation, rotation about a fixed axis, or general plane motion (~2.5 weeks)
5. Kinetics of rigid bodies (i.e., utilizing free-body diagrams to derive the equations of motion) (~ 2.5 weeks)
6. Work and Energy Concepts (particles and rigid bodies) (~ 2 weeks)
7. Impulse and Momentum Concepts (particles and rigid bodies) (~ 2 weeks)

**GRADING STANDARD:**

Homework and in-class participation	10%	A - 90 to 100 points
Quiz 1	15%	B - 80 to 89 points
Quiz 2	15%	C - 70 to 79 points
Exam 1	30%	D - 60 to 69 points
Exam 2	30%	F - Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
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**Department of Civil Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:** **CVEN-206: Mechanics of Solids Lecture [3 Credit Hr]**

**PRE/CO-REQ:** Pre-req: CVEN-201 Engineering Mechanics & Co-req: CVEN-207  
Mechanics of Solids Lab

**COURSE TYPE:** Required Course

**CATALOG DATA:** Mechanics of solids deals with the strength and physical performance of man-made or natural structures. This course covers axial forces, shear and moment, stress and axial loads, strain and axial deformation, torsion of shaft, stress in beams, columns, deflection of beams, energy methods, and elemental indeterminate problems. These concepts are essential for the design and analysis of all mechanical and structural systems.

**TEXT BOOK:** Mechanics of Materials, Brief SI Edition, by James M. Gere and Barry Goodno, 1st Edition, Cengage Learning, 2012, (ISBN 1-111-13603-3)

*Instructor will supplement with course notes*

References: Mechanical Behavior of Materials by Norman E. Dowling, 2<sup>nd</sup> Ed., Prentice Hall, 1999

**INSTRUCTOR:** Kate L. Klein, Ph.D.  
Building: 42/213N, Email: [kate.klein@udc.edu](mailto:kate.klein@udc.edu) , Phone: 202-274-7131

**OFFICE HOURS:** M 3:30-5:30 PM, W 10:00 AM-12:00 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

<b>LECTURES:</b>	Monday	2:00-3:20 PM	42/210
	Wednesday	2:00-3:20 PM	42/210

**COURSE OBJECTIVES:**

This course provides students with an understanding of the relationship between the external forces applied to a structure and the resulting behavior and deformation of the parts of that structure. This course lays foundation for engineering design.

Topics include:

- Mechanical properties of materials and Hooke's Law
- Axial Loading, Shear Loading, Torsion, and Bending

- Stress and Strain Transformations, Mohr's Circle
- Design of Beams and Shafts, Deflections of Beams
- Combined Loading and Statically Indeterminate Structures

### **STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Articulate the basic mechanical properties of engineering materials (elastic constants, yield strength, ultimate strength, and ductility)
- Derive mechanical properties of materials from stress-strain curves/data and utilize Hooke's Law to relate stress and strain
- Determine the internal stress and related strain in members subjected to axial loading, shear loading, torsion, and bending as well as a combined loading
- Compute the principal normal stresses and maximum shear stresses
- Compute the stress state both analytically and graphically (Mohr's Circle) at various orientation angles
- Utilize the loading on determinate structures to draw shear and bending moment diagrams and determine maximum shear, maximum bending, member deflections and curvature
- Calculate the normal and shear stresses in beams of various cross-sections
- Design simple structural members to withstand a specified allowable load or satisfy other practical constraints
- Solve statically indeterminate problems

### **COURSE OUTLINE:**

1. Introduction and Normal Stress and Strain (1 week)
2. Mechanical Properties of Materials, Hooke's Law and Poisson's Ratio (1 week)
3. Shear Stress and Strain, Design for Allowable Loading (1 week)
4. Changes in Length of Axially Loaded Members (1 week)
5. Statically Indeterminate Structures, Thermal Effects, Misfits and Prestrains (1 week)
6. Uniform Torsion in Circular Bars, Non-Uniform Torsion, Pure Shear (1.5 weeks)
7. Transmission of Power by Shafts, Statically Indeterminate Torsion (1 week)
8. Stresses on Inclines, Plane Stress and Principal Stress (1 week)
9. Max Shear and Mohr's Circle (1 week)
10. Hooke's Law for Plane Stress, Triaxial Stress, Pressure Vessels (0.5 week)
11. Beams, Loads, Reactions, Shear Force and Bending Moments (1 week)
12. Shear Force and Bending Moment Diagrams (1 week)
13. Pure Bending, Curvature, Strain & Normal Stress in Beams (1 week)
14. Design of Beams and Shear Stress for Different Cross-sections (1 week)

### **GRADING STANDARD:**

Midterm	25%	A - 90 to 100 points
Final	25%	B - 80 to 89 points
Homework	25%	C - 70 to 79 points

Attendance & Participation 25%

D - 60 to 69 points

F - Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:** CVEN-207: Mechanics of Solids Lab [1 Credit Hr]

**PRE/CO-REQ:** Co-req: CVEN-206 Lecture

**COURSE TYPE:** Required Course

**CATALOG DATA:** Covers introduction, purpose, scope, equipment/apparatus, interpreting results, errors, writing reports. Experiments include physical properties of and mechanical response of engineering materials, stress and strain measurement, torque, bending moment, and deflection of beams.

**TEXT BOOK:** Mechanics of Materials, Brief SI Edition, by James M. Gere and Barry Goodno,  
1st Edition, Cengage Learning, 2012, (ISBN 1-111-13603-3)  
References: Materials Science and Engineering, An Introduction, by  
W.D. Callister, Jr., 8th Ed., Wiley, 2010.

**INSTRUCTOR:** Kate L. Klein, Ph.D.  
Building: 42/213N, Email: [kate.klein@udc.edu](mailto:kate.klein@udc.edu) , Phone: 202-274-7131

**OFFICE HOURS:** M 3:30-5:30 PM, W 10:00 AM-12:00 PM

**INSTRUCTIONAL FORMAT:** Laboratory

**LABORATORY:** Wednesday 2:00-3:20 PM 32/ C04C Mechanical Testing Lab

**COURSE OBJECTIVES:**

This lab provides students with hands-on testing of engineering materials and observation of the relationship between the external forces applied to a structure and the resulting behavior and deformation of the parts of that structure. Students will learn to collect data and write comprehensive lab reports. This course supplements the Mechanics of Solids Lecture (CVEN-206) and lays foundation for engineering design.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Measure specimen accurately using calipers and/or micrometer; understand the significance of uncertainty and the importance of repeated measurement [A-5, B-2]

- Conduct virtual tensile tests using simulation software and determine elastic and plastic properties of materials [B-2, K-1]
- Collect tensile data and utilize Hooke's Law to relate stress and strain; and derive mechanical properties of materials from stress-strain curves [A-3, B-2, K-1]
- Comprehend the signs and implications of ductile vs. brittle failure [A-3, F-1]
- Design and test various beam geometries to maximize stiffness and minimize bending [B-2, C-3]
- Compare results to theoretical values, identify sources of error and justify any discrepancies [B-4, E-3]
- Apply and articulate the fundamental concepts of Mechanics of Solids effectively in laboratory reports with appropriate data plots and format [G-1, G-4]

**COURSE OUTLINE:**

1. Data collection, measurement, statistical analysis, and uncertainty
2. Virtual tensile testing and analysis of stress-strain curves
3. Hooke's Law for Springs and Tension Testing of Common Materials
4. Tensile Testing of Metals and Polymers
5. Thermal Expansion
6. Compression
7. Torsion
8. Centroids and Moments of Inertia
9. Bending Moment and Deflection of Beams

**GRADING STANDARD:**

Lab reports	35%	A - 90 to 100 points
Worksheets	35%	B - 80 to 89 points
Attendance & Participation	30%	C - 70 to 79 points
		D - 60 to 69 points
		F - Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Mechanical Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:**           **MECH-208: Thermodynamics [3 Credit Hr]**

**PRE/CO REQ:**       Pre-req: PHYS-201 Physics II

**COURSE TYPE:**     Required Course

**CATALOG DATA:** Covers thermodynamic concepts, zeroth law, thermodynamic properties, first law and second law analysis of closed and open systems; availability and irreversibility analysis; power and refrigeration cycles; mixture of gases and psychrometrics.

**TEXT BOOK:**        Fundamentals of Thermodynamics by Claus Borgnakke and Richard E. Sonntag, 7th Edition, Wiley, 2009 (ISBN 978-0-470-04192-5)

*Instructor will supplement with course notes*

References:    Computer Aided Thermodynamic Tables (CATT3 software available with text), Wiley, 1996.

Thermodynamics, An Engineering Approach by Y.A. Cengel and M.A. Boles, 7<sup>th</sup> Edition, McGraw-Hill, 2006.

**INSTRUCTOR:**     Kate L. Klein, Ph.D.  
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**OFFICE HOURS:**   M 3:30 – 5:30 PM, W 10:00 – 11:00 AM and 1:00 – 2:00 PM

**INSTRUCTIONAL FORMAT:**   Classroom Lecture

<b>LECTURES:</b>	Monday	11:00- AM 12:20 PM	42/210
	Wednesday	11:00- AM 12:20 PM	42/210

**COURSE OBJECTIVES:**

The main objective of this course is to provide a clear and rigorous introduction to classical engineering thermodynamics as well as the current relevance of thermodynamics. It will prepare students to understand, analyze and solve thermodynamic problems in a simple and logical manner.

Topics include:

- Properties of (pure) substances
- Conservation of mass and energy (1<sup>st</sup> Law of Thermodynamics)

- Entropy and the 2<sup>nd</sup> Law of Thermodynamics
- Vapor and gas power cycles and refrigeration cycles

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Articulate the fundamental concepts of Thermodynamics
- Determine and articulate the properties of a pure substance
- Apply the 1<sup>st</sup> Law of Thermodynamics to open and closed system problems
- Apply the 2<sup>nd</sup> Law of Thermodynamics to systems and evaluate efficiency
- Analyze power and refrigeration cycles using the concept of entropy and the 2<sup>nd</sup> Law
- Read and understand thermodynamic tables and charts and utilize software programs in order to solve engineering problems
- Understand modern applications and challenges of thermodynamics

**COURSE OUTLINE:**

1. Introduction to Thermodynamics Applications and Fundamental Concepts (1 weeks)
2. Properties of a Pure Substance (2 weeks)
3. Work and Heat (1 week)
4. First Law of Thermodynamics (2 weeks)
5. First-Law Analysis for a Control Volume (2 weeks)
6. Second Law of Thermodynamics (2 weeks)
7. Entropy (1 week)
8. Second-Law Analysis for a Control Volume (1 week)
9. Irreversibility and Availability (1 week)
10. Power and Refrigeration Cycles (1 week)

**GRADING STANDARD:**

Midterm	15%	A - 90 to 100 points
Final	15%	B - 80 to 89 points
Quizzes	10%	C - 70 to 79 points
Homework	25%	D - 60 to 69 points
Attendance & Participation	25%	D - 60 to 69 points
Applications Paper	10%	F - Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Mechanical Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:** CVEN-308: Applied Numerical Analysis for Engineers [3 Credit Hr]

**PRE/CO-REQ:** MATH 260

**COURSE TYPE:** Required Course

**CATALOG DATA:** Covers modeling and error analysis, roots of equations; systems of linear algebraic equations, curve fitting; numerical differentiation and integration; ordinary differential equations; partial differential equations.

**TEXT BOOK:** Applied Numerical Methods with MATLAB for Engineers and Scientists, Chapra and Canale, 3rd Edition. McGraw Hill, NY, 2012.  
Numerical Methods for Engineers, Chapra and Canale, 6th Edition. McGraw Hill, NY, 2010.

**INSTRUCTOR:** Lara A. Thompson, Ph.D.  
Building: 42/213M, Email: [lara.thompson@udc.edu](mailto:lara.thompson@udc.edu)  
Phone: 202-274-5046

**OFFICE HOURS:** Tues. & Thurs. 11:00 AM - 12:30 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:**

Tuesday	9:30 - 10:50 AM	42-210
Thursday	9:30 - 10:50 AM	42-210

**COURSE OBJECTIVES:**

The course objective is to apply numerical techniques in the context of engineering applications. Example problems and problems sets will be solved using computer-based tools (e.g., spreadsheet and computational/symbolic processing software packages).

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Articulate the basic concepts of the math methods covered in the course
- Utilize appropriate software and tools (e.g., MATLAB and Excel) as aids for problem solving
- Understand and utilize numerical root-finding methods

- Solve systems of linear algebraic equations
- Utilize and apply knowledge of numerical integration and numerical differentiation
- Understand and apply knowledge of time-frequency domain analyses (e.g., Laplace Transform methods to solve ordinary differential equations)
- Perform statistical analyses (e.g., determining mean, standard deviation, and other measures) on data sets
- Perform and understand the utility of linear regression analyses on sets of data
- Understand the “big picture” of real-life scenarios and engineering applications of mathematical methods

**COURSE OUTLINE:**

1. Introduction
2. Linear Algebraic Equations
3. Root finding and Optimization
4. Curve fitting, linear regression, and Interpolation
5. Numerical Integration
6. Numerical Differentiation
7. Ordinary Differential Equations
8. Laplace Transform Methods
9. Solution to engineering problems using symbolic computer coding

**GRADING STANDARD:**

Homework and in-class participation	10%	A - 90 to 100 points
Projects	30%	B - 80 to 89 points
Exam 1	30%	C - 70 to 79 points
Exam 2	30%	D - 60 to 69 points
		F - Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** CVEN-311 Theory of Structures Lecture [3 Credit Hr]

**PRE/CO-REQ:** Pre-Req: CVEN-206 Mechanics of Solids & Co-Req: CVEN 313 Theory of Structures Lab

**COURSE TYPE:** Required Course

**CATALOG DATA:** A structure such as a building, a bridge, an aircraft frame, a tower, etc. refers to a system of connected parts used to support a load. This course deals with the relationship between the external forces applied to a structure and the resulting behavior of the parts.

**TEXT BOOK:** Structural Analysis by Russel C. Hibbeler, Seventh Edition, Prentice Hall, 2009

ACI 318-02 Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute, 1999

References:

Structural Analysis, A Classical and Matrix Approach by McCormac, Nelson, 2nd Edition, John Wiley and Sons, 1997

Fundamentals of Structural Analysis by Harry H. West, Geschinder, Second Edition, John Wiley and Sons, 2002

**INSTRUCTOR:** Ahmet Zeytinci, Ph.D., P.E., Fellow NSPE, Professor  
Building: 42/213-H, Email: [azeytinci@udc.edu](mailto:azeytinci@udc.edu), Phone: 202-274-6186

**OFFICE HOURS:** T, Th 3:30 - 4:30 PM, W 10:00 AM - 2:00 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:**

Tuesday	12:30 – 1:50 PM	42/210
Thursday	12:30 – 1:50 PM	42/210

**COURSE OBJECTIVES:**

The primary objective of this course is to develop a proficient understanding of structural behavior and the analytical methods which are used to evaluate forces and deflections on 2-D structures such as beams, trusses, and frames.

- Introduction, Structures, Design Codes, Loads

- Analysis of Statically Determinate Beams, Trusses, Frames
- Influence Lines, Absolute Max. Shear and Moment
- Energy Methods, Three-Moment and Slope Deflection
- Computer Analysis of Beams and Trusses
- Computer Analysis / Beam and Truss Deflections

### **STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Produce graduates equipped to pursue careers in structural analysis and design in industry, the public sector and non-governmental organizations.
- Provide the basis for the recognition and understanding of the major features of structural engineering;
- Develop an understanding of how KSAs may be applied in practice in an economic and environmentally sustainable manner;
- Foster the acquisition and implementation of analytical skills and practical applications related to structural engineering.
- Attract highly motivated students irrespective of race, gender, background and physical disability from DC public schools, local community colleges and overseas.
- Develop new areas of teaching in response to the advance of scholarship and the needs of the community including architecture and vocational training.
- Articulate the diverse constraints that are representatives of what students will encounter in structural engineering practice.
- Develop a proficient understanding of structural behavior and the analytical methods which are used to evaluate forces and deflections.

### **COURSE OUTLINE:**

1. Introduction, Classification of Structures
2. Building Codes and Specifications, ACI, AISC
3. Service Loads and Factored Loads, *DL*, *LL*, Wind Loads & *EQL*.
4. Idealized Structures, Equations of Equilibrium
5. Analysis of Statically Determinate Beams and V,M,N Diagrams
6. Analysis of Statically Determinate Trusses, Zero-Force Members
7. Influence Lines for Statically Determinate Structures
8. Approximate Analysis of Statically Indeterminate Structures
9. Deflections of Statically Determinate Beams and Trusses
10. Deflections, Principle of Virtual Work, Beams, Frames & Trusses
11. Analysis of Statically Indeterminate Beams and Frames
12. Analysis of Statically Indeterminate Structures by Force Method
13. Analysis, Slope Deflection Method for Beams and Frames
14. Analysis, Moment Distribution Method for Beams and Frames
15. Computer Analysis of Trusses, Beams, Frames
16. Analysis of Various Structures using BEAM-2D Software

### **GRADING STANDARD:**

Mid-term Test	20%	A – 90 to 100 points
Final Test	20%	B – 80 to 89 points

Homework & Attendance	30%	C – 70 to 79 points
Quizzes	30%	D – 60 to 69 points
		F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:** CVEN-312 Design of Steel Structures [3 Credit Hr]

**PRE/CO-REQ:** Pre-Req: CVEN-311 Theory of Structures Lecture

**COURSE TYPE:** Required Course

**CATALOG DATA:** Design of Steel Structures covers the analysis and design of individual steel members such as tension members, compression members and columns, beams, beam-columns, frame analysis AISC, and simple connections.

**TEXT BOOK:** LRFD Steel Design by William T. Segui, 5th Edition, Cengage Learning, Thomson Publishing, 2011  
 AISC MANUAL OF STEEL CONSTRUCTION, 13<sup>rd</sup> Edition, American Institute of Steel Construction, 2008  
 References: Jack C. McCormac, STRUCTURAL STEEL DESIGN, LRFD METHOD, 4th Edition, Prentice Hall, 2008  
 E.H. Gaylord, C.N. Gaylord, James E. Stallmeyer, DESIGN OF STEEL STRUCTURES, 3rd Edition, McGraw-Hill, 1992

**INSTRUCTOR:** Ahmet Zeytinci, Ph.D., P.E., Fellow NSPE, Professor  
 Building: 42/213-H, Email: [azeytinci@udc.edu](mailto:azeytinci@udc.edu), Phone: 202-274-6186

**OFFICE HOURS:** T, Th 3:30 - 4:30 PM, W 10:00 AM - 2:00 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:**

Tuesday	12:30 – 1:50 PM	42/114B
Thursday	12:30 – 1:50 PM	42/114B

## **COURSE OBJECTIVES:**

The primary objective of Design of Steel Structures is to furnish the student with a basic understanding of the determination of the overall proportions and dimensions of the supporting framework and the selection of the cross sections of individual members.

- Structural Steel, Building Codes, Specifications,
- Service Loads and Factored Loads
- Design Philosophies, LRF used in AISC Specifications
- Design of Tension Members
- Design of Compression Members and Columns
- Design of Beams, Bearing Plates, Column Base Plates
- Deflections of determinate beams, Manual / Computer
- Analysis of Steel Structures using Computer Software

## **STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Produce graduates equipped to pursue careers in structural analysis and design in industry, the public sector and non-governmental organizations.
- Provide the basis for the recognition and understanding of the major features of structural engineering;
- Develop an understanding of how KSAs may be applied in practice in an economic and environmentally sustainable manner;
- Foster the acquisition and implementation of analytical skills and practical applications related to structural engineering.
- Attract highly motivated students irrespective of race, gender, background and physical disability from DC public schools, local community colleges and overseas.
- Develop new areas of teaching in response to the advance of scholarship and the needs of the community including architecture and vocational training.
- Articulate the diverse constraints that are representatives of what students will encounter in structural engineering practice.
- Provide an introduction to the subject for students from other relevant disciplines such as architecture

## **COURSE OUTLINE:**

1. Structural Steel Properties
2. Building Codes and Specifications, AISC
3. Service Loads and Factored Loads
4. Design Philosophies, ASD and LRFD per AISC Specifications
5. Design of Tension Members, Effective Area, Staggered fasteners
6. Design of Compression Members and Columns
7. Columns, AISC Requirements, Tables for Compression
8. Design of Steel Beams, Bending Stress, Plastic Moment
9. Design of Flexural Members Bearing Plates, Column Base Plates
10. Design of Open-Web-Steel Joist Systems, OWSJs
11. Design of Beam Columns / Connections
12. Deflections of Determinate Beams, Manual / Computer
13. Analysis of Steel Structures using BEAM-2D Software

**GRADING STANDARD:**

Mid-term Test	20%	A – 90 to 100 points
Final Test	20%	B – 80 to 89 points
Homework & Attendance	20%	C – 70 to 79 points
Quizzes	40%	D – 60 to 69 points
		F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** CVEN-313 Theory of Structures Lab [1 Credit Hr]

**PRE/CO-REQ:** Pre-Req: CVEN-206 Mechanics of Solids & Co-Req: CVEN 311 Theory of Structures Lab

**COURSE TYPE:** Required Course

**CATALOG DATA:** A structure such as a building, a bridge, an aircraft frame, a tower, etc. refers to a system of connected parts used to support a load. This course deals with the relationship between the external forces applied to a structure and the resulting behavior of the parts.

**TEXT BOOK:** Structural Analysis by Russel C. Hibbeler, Seventh Edition, Prentice Hall, 2009

References: ACI 318-02 Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute, 1999

Structural Analysis, A Classical and Matrix Approach by McCormac, Nelson, 2nd Edition, John Wiley and Sons, 1997

Fundamentals of Structural Analysis by Harry H. West, Geschinder, Second Edition, John Wiley and Sons, 2002

**INSTRUCTOR:** Ahmet Zeytinci, Ph.D., P.E., Fellow NSPE, Professor  
Building: 42/213-H, Email: [azeytinci@udc.edu](mailto:azeytinci@udc.edu), Phone: 202-274-6186

**OFFICE HOURS:** T, Th 3:30 - 4:30 PM, W 10:00 AM - 2:00 PM

**INSTRUCTIONAL FORMAT:** Laboratory

**LABORATORY:** Tuesday 2:00 – 3:20 PM 42/111  
Thursday 2:00 – 3:20 PM 42/111

**COURSE OBJECTIVES:**

The primary objective of this course is to develop a proficient understanding of structural behavior and the analytical methods which are used to evaluate forces and deflections on 2-D structures such as beams, trusses, and frames.

- Introduction, Structures, Design Codes, Loads

- Analysis of Statically Determinate Beams, Trusses, Frames
- Influence Lines, Absolute Max. Shear and Moment
- Energy Methods, Three-Moment and Slope Deflection
- Computer Analysis of Beams and Trusses
- Computer Analysis / Beam and Truss Deflections

### **STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Produce graduates equipped to pursue careers in structural analysis and design in industry, the public sector and non-governmental organizations.
- Provide the basis for the recognition and understanding of the major features of structural engineering;
- Develop an understanding of how KSAs may be applied in practice in an economic and environmentally sustainable manner;
- Foster the acquisition and implementation of analytical skills and practical applications related to structural engineering.
- Attract highly motivated students irrespective of race, gender, background and physical disability from DC public schools, local community colleges and overseas.
- Develop new areas of teaching in response to the advance of scholarship and the needs of the community including architecture and vocational training.
- Articulate the diverse constraints that are representatives of what students will encounter in structural engineering practice.
- Develop a proficient understanding of structural behavior and the analytical methods which are used to evaluate forces and defls.

### **COURSE OUTLINE:**

1. Introduction, Classification of Structures
2. Building Codes and Specifications, ACI, AISC
3. Service Loads and Factored Loads, *DL*, *LL*, Wind Loads & *EQL*.
4. Idealized Structures, Equations of Equilibrium
5. Analysis of Statically Determinate Beams and V,M,N Diagrams
6. Analysis of Statically Determinate Trusses, Zero-Force Members
7. Influence Lines for Statically Determinate Structures
8. Approximate Analysis of Statically Indeterminate Structures
9. Deflections of Statically Determinate Beams and Trusses
10. Deflections, Principle of Virtual Work, Beams, Frames & Trusses
11. Analysis of Statically Indeterminate Beams and Frames
12. Analysis of Statically Indeterminate Structures by Force Method
13. Analysis, Slope Deflection Method for Beams and Frames
14. Analysis, Moment Distribution Method for Beams and Frames
15. Computer Analysis of Trusses, Beams, Frames
16. Analysis of Various Structures using BEAM-2D Software

### **GRADING STANDARD:**

Mid-term Test	20%	A – 90 to 100 points
Final Test	20%	B – 80 to 89 points

Homework & Attendance  
Quizzes

30%  
30%

C – 70 to 79 points  
D – 60 to 69 points  
F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** CVEN-325: Hydrology and Hydraulics Lecture [3 Credit Hr]

**PRE/CO-REQ:** Pre-Req: CVEN-201 Engineering Mechanics & Co-Req: CVEN 327  
Hydrology & Hydraulics Lab

**COURSE TYPE:** Required Course

**CATALOG DATA:** This course covers hydrologic processes, precipitation and precipitation analysis, hydrologic losses, infiltration, evaporation, runoff processes and estimation, fluid Properties and fundamental of fluid properties, flow in closed conduits, flow in open channels, hydraulic structures, and fluid flow measurements.

**TEXT BOOK:** Hydrology and Hydraulic Systems, by Ram S. Gupta  
Third Edition, Waveland Press, Illinois, 2007 (ISBN 1-57766-455-8)  
*Instructor will supplement with course notes*  
References: Water Resources Engineering by David A. Chin, Prentice  
Hall, ISBN 0-13-148192-4

**INSTRUCTOR:** Pradeep K. Behera, Ph.D., P.E., D. WRE  
Building: 42/213F, Email: [pbehera@udc.edu](mailto:pbehera@udc.edu) , Phone: 202-274-6186

**OFFICE HOURS:** M 11:00-12:00 PM, T 10:00 AM-2:00 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Monday 12:30 – 1:50 PM 42/107  
Wednesday 12:30 – 1:50 PM 42/107

**COURSE OBJECTIVES:**

The overall objective of this course is to provide students with an introduction to hydrology and hydraulics as an engineering science and as a tool for the design and operation of water resource systems. This is primarily an analysis course and the course will cover fundamentals background for water resource system design. The course has two components. The first one deals with Hydrologic analysis and second one deal with Hydraulic analysis.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Articulate key processes of hydrologic cycle and explain how these processes are related to engineering hydrology and hydraulics and their application in solving the water resources engineering problems
- Perform statistical precipitation data analysis, estimate missing precipitation data, estimate areal precipitation over an area, understanding of design storm and use of IDF curves
- Identify different types of hydrologic loss components, estimate losses including infiltration loss and evaporation loss and apply NRCS method to estimate runoff from rainfall
- Identify watershed characteristics, calculate travel time and time of concentration, estimate runoff hydrograph, develop unit hydrograph and runoff hydrograph from a watershed
- Solve problems in relation to fluid properties including viscosity, pressure and surface tension
- Apply conservation of mass, conservation of energy and conservation of momentum principles to solve fluid system problems including Bernoulli's principle
- Estimate friction loss in closed pipe systems and estimate minor losses
- Apply engineering principles to open channel flow including estimation of hydraulic radius and depth, uniform flow, Manning's equation, design of channels, conduct hydraulic jump calculations
- Calculate flow from flow measuring devices and hydraulic structures.
- Understand basic principles of sustainable engineering practice.

### **COURSE OUTLINE:**

1. Introduction to course material and background concepts (0.5 week)
2. Introduction to Hydrology, Hydrologic Processes (0.5 week)
3. Precipitation and Precipitation Analysis (1.5 week)
4. Hydrologic Losses and Infiltration (1.0 week)
5. Runoff Processes and Estimation (2.0 weeks)
6. Hydrologic and Hydraulic Routing (1.0 week)
7. Review of Fundamentals of Fluid Mechanics (1.5 week)
8. Flow in Closed Conduits (2.0 weeks)
9. Flow in Open Channels (1.5 weeks)
10. Hydraulic Structures and Fluid Flow Measurements (1.0 week)
11. Introduction to Sustainability Engineering (0.5 week)
12. Quiz and examinations (1 week)

### **GRADING STANDARD:**

Mid-term Test	30%	A – 90 to 100 points
Final Test	30%	B – 80 to 89 points
Quizzes, Assignment & Attendance	40%	C – 70 to 79 points
		D – 60 to 69 points
		F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** CVEN-331: Principle of Geotechnical Engineering Lec. [3 Credit Hr]

**PRE/CO-REQ:** 3509-206 Mechanics of Solids, PHYS 201 University Physics I

**COURSE TYPE:** Required Course

**CATALOG DATA:** Principles of Geotechnical Engineering. Credits 3.  
Studies soil origin, classification, moisture-density relationships, soil stress distribution, immediate and consolidation settlement, time rate of settlement permeability & seepage, and shear strength of soils.

**TEXT BOOK:** Braja M. Das, **PRINCIPAL OF GEOTECHNICAL ENGINEERING**, Latest Edition, PWS Publishing Company..

**INSTRUCTOR:** Inder J. Bhambri, Professor (taught by Dr. Balehager Ayalew, Adjunct)  
Building 42/C-10C, Tel: 202-274-6327  
Email: [ibhambri@udc.edu](mailto:ibhambri@udc.edu)

**OFFICE HOURS:** Upon request

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:**

Tuesday	4:00 – 5:20 PM	42/210
Thursday	4:00 – 5:20 PM	42/210

**COURSE OBJECTIVES:**

The objective of this course is to prepare a civil engineering student to understand origin of soils, soils terminology, engineering properties of soils as they relate to design of foundations and earth structures.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- State different types of soils, their origin and formation
- Calculate moisture content, degree of saturation, porosity, void ratio, and dry & saturated unit weights of a given soil sample
- Explain Atterberg Limits, liquid limit, plastic limit, shrinkage limit and Plasticity Index of soils

- Perform soil particle size analysis calculations and obtain soil properties by plotting particle size analysis curves
- Classify a given soil sample by using AASHTO and Unified classification systems
- Evaluate soil compaction properties in terms of optimum moisture content and maximum dry unit weight
- Calculate rate and quantity of water seepage through the soils, under a masonry dam and through an earthen dam
- Calculate total, effective and neutral stresses in a soil profile
- Calculate stress increase in at any depth due to applied load on ground surface for various shapes of footings
- Calculate elastic and time-dependent settlements using Terzaghi's consolidation theory
- Calculate shear strength of a given soil using results of direct shear test, unconfined shear test and triaxial shear test.

### **COURSE OUTLINE:**

1. Introduction, rock cycle and soil origin, 1 week
2. Clay mineralogy, weight-volume relationships, soil consistency, particle size distribution, 1.5 weeks
3. Soil structure, soil classification, 1.5 weeks
4. Soil compaction, moisture-density relationships, 1 week
5. Permeability, seepage, flow nets, uplift pressure, 1.5 weeks
6. Effective stress concept, capillary rise of water, quick sand condition concept, 1.5 weeks
7. Stresses in a soil mass, major & minor principal stresses, Boussinesq and Westergaard solutions, 2 weeks
8. Soil compressibility, one-dimensional consolidation, settlement calculations, time rate of consolidation, 2 weeks
9. Shear strength of soil, direct shear, unconfined compression, triaxial shear, vane shear, 2 weeks.

### **GRADING STANDARD:**

Attendance and or/Homework	10%	A	(100-90)%
Exam # 1	22.5%	B	(89-75)%
Mid-term Evaluation	22.5%	C	(74-65)%
Exam # 2	22.5%	D	(64-50)%
Final Exam	22.5%		



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** **CVEN-331: Principle of Geotechnical Engineering Lab. [1 Credit Hr]**

**PRE/CO-REQ:** 3509-206 Mechanics of Solids, PHYS 201 University Physics I

**COURSE TYPE:** Required Course

**CATALOG DATA:** Principles of Geotechnical Engineering. Credits 1.  
Studies soil origin, classification, moisture-density relationships, soil stress distribution, immediate and consolidation settlement, time rate of settlement permeability & seepage, and shear strength of soils.

**TEXT BOOK:** Braja M. Das, **PRINCIPAL OF GEOTECHNICAL ENGINEERING**, Latest Edition, PWS Publishing Company..

**INSTRUCTOR:** Inder J. Bhambri, Professor (taught by Dr. Balehager Ayalew, Adjunct)  
Building 42/C-10C, Tel: 202-274-6327  
Email: [ibhambri@udc.edu](mailto:ibhambri@udc.edu)

**OFFICE HOURS:** Upon request

**INSTRUCTIONAL FORMAT:** Classroom Lecture

<b>LECTURES:</b>	Tuesday	4:00 – 5:20 PM	42/210
	Thursday	4:00 – 5:20 PM	42/210

**COURSE OBJECTIVES:**

The objective of this course is to prepare a civil engineering student to understand origin of soils, soils terminology, engineering properties of soils as they relate to design of foundations and earth structures.

**STUDENT LEARNING OUTCOMES:**

The goal of this course is to familiarize a student with laboratory test equipment and procedures to determine engineering properties of soils, such as, visual soil identification, specific gravity, particle size distribution, Atterberg limits, soil compaction, California bearing ratio, shear strength test and consolidation test. Upon completion the student will be able to perform listed tests independently per ASTM and/or AASHTO specifications.

**COURSE OUTLINE:**

1. Introduction, rock cycle and soil origin, 1 week
2. Clay mineralogy, weight-volume relationships, soil consistency, particle size distribution, 1.5 weeks
3. Soil structure, soil classification, 1.5 weeks
4. Soil compaction, moisture-density relationships, 1 week
5. Permeability, seepage, flow nets, uplift pressure, 1.5 weeks
6. Effective stress concept, capillary rise of water, quick sand condition concept, 1.5 weeks
7. Stresses in a soil mass, major & minor principal stresses, Boussinesq and Westergaard solutions, 2 weeks
8. Soil compressibility, one-dimensional consolidation, settlement calculations, time rate of consolidation, 2 weeks
9. Shear strength of soil, direct shear, unconfined compression, triaxial shear, vane shear, 2 weeks.

**GRADING STANDARD:**

Attendance and or/Homework	10%	A	(100-90)%
Exam # 1	22.5%	B	(89-75)%
Mid-term Evaluation	22.5%	C	(74-65)%
Exam # 2	22.5%	D	(64-50)%
Final Exam	22.5%		



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
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**FALL 2013**

**COURSE**

**SYLLABUS:** CVEN-352: CE Materials Lec. [3 Credit Hr]

**PRE/CO-REQ:** 3509-206 Mechanics of Solids,

**COURSE TYPE:** Required Course

**CATALOG DATA:** Principles of Geotechnical Engineering. Credits 3.  
Studies properties and uses of common civil engineering materials, such as, cement, aggregates, concrete, asphalts, asphalt mixes, steel and wood. Design techniques of Portland cement concrete mix and hot mix asphalts. Lec. 3 hours.

**TEXT BOOK:** Portland Cement Association, Design and Control of Concrete Mixture, Fifteenth Edition, Portland Cement Association, 5420 Old Orchard Road, Skokie, IL 60077

Reference Materials:

- Mamlouk, S., Zeniewski, J.P., Materials for Civil And Construction Engineers, Prentice Hall
- Marotta, T., Coffey, J.C., Basic Construction Materials, Prentice Hall
- AASHTO Materials, Specifications, American Association of Highway & Transportation Officials, Washington, D.C.
- ASTM Standards, American Society of Testing & Materials, Philadelphia, PA

**INSTRUCTOR:** Inder J. Bhambri, Professor (taught by Dr. Balehager Ayalew, Adjunct)  
Building 42/C-10C, Tel: 202-274-6327  
Email: [ibhambri@udc.edu](mailto:ibhambri@udc.edu)

**OFFICE HOURS:** Upon request

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Tuesday 4:00 – 5:20 PM 42/210  
Thursday 4:00 – 5:20 PM 42/210

**COURSE OBJECTIVES:**

Learning goal of Civil Engineering Materials course is to prepare students to understand and become familiar with mechanical and physical properties of materials, such as, Portland cement, aggregates, Portland cement concrete, asphalt, asphalt mix, steel and wood used in construction.

**Learning Outcomes:**

Upon completion of the course the student will be able to:

- Name raw materials used in manufacture of Portland cement
- Explain manufacturing process of Portland cement
- Name various types of cements, especially ASTM types of Portland cements and describe their uses
- Describe ASTM physical requirements of Portland cements
- Name various types of aggregates, and state their physical properties
- Perform calculations for design of Portland cement concrete using absolute volume and trial batch methods
- Adjust design proportions of cement, aggregates, water and admixtures based on test results of original design
- Explain transportation, placing, consolidating and finishing of concrete
- Cite different techniques of curing concrete structures
- Describe refining process of crude oil as it relates to production of asphalt
- Name various types of asphalts and describe their physical requirements
- Design an asphalt mix to meet specified requirements
- Name types of wood species as used in construction
- Cite mechanical requirements of steel for use as reinforcing bars in concrete

**COURSE OUTLINE:**

1. To introduce students to aggregates, cements and concretes
2. To learn raw materials used in manufacture of Portland cement, and the manufacturing process
3. To learn various types of Portland cements and other cements, their chemical properties, and their use
4. To learn physical requirements of ASTM type Portland cements
5. To understand types of aggregates, their physical properties, such as, gradation, specific gravity, absorption capacity, particle shape and surface texture
6. To learn design process and technique of Portland cement concrete using absolute volume method and trial batch method
7. To understand transporting, placing and finishing of concrete
8. To learn curing techniques of hardened concrete
9. To understand refining process of crude oil to obtain asphalt
10. To learn various types of asphalts, such as, asphalt cements, cutback asphalts, emulsified asphalts and their physical requirements as specified by ASTM and AASHTO
11. To design asphalt mixes using Marshall method and Superpave method
12. To learn types of woods used in construction and their properties
13. To learn mechanical properties of steel for use in construction

**GRADING STANDARD:**

Attendance and or/Homework	10%	A	(100-90)%
Quizzes	40%	B	(89-75)%

Mid-term Evaluation	25%	C	(74-65)%
Final Assessment	25%	D	(64-50)%



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
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**FALL 2013**

**COURSE**

**SYLLABUS:** CVEN-354: CE Materials Lab. [1 Credit Hr]

**PRE/CO-REQ:** 3509-206 Mechanics of Solids,

**COURSE TYPE:** Required Course

**CATALOG DATA:** Laboratory tests to determine properties of materials used in construction, such as. Cements, aggregates, concrete, asphalts, asphalt mixes, wood and steel. Lab. 3 hours

**TEXT BOOK:** Inder J. Bhambri, Cement Aggregate Concrete, University of the District of Columbia. Instructors Handouts

**Reference Materials:**

- AASHTO Materials, Specifications and Tests, American Association of Highway & Transportation Officials, Washington, D.C.
- ASTM Standards, American Society of Testing & Materials, Philadelphia, PA

**INSTRUCTOR:** Inder J. Bhambri, Professor (taught by Dr. Balehager Ayalew, Adjunct)  
Building 42/C-10C, Tel: 202-274-6327  
Email: [ibhambri@udc.edu](mailto:ibhambri@udc.edu)

**OFFICE HOURS:** Upon request

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Tuesday 4:00 – 5:20 PM 42/210  
Thursday 4:00 – 5:20 PM 42/210

**COURSE OBJECTIVES:**

Learning goal of Civil Engineering Materials course is to prepare students to understand and become familiar with mechanical and physical properties of materials, such as, Portland cement, aggregates, Portland cement concrete, asphalt, asphalt mix, steel and wood used in construction.

**Learning Outcomes:**

Upon completion of the course the student will be able to:

- Determine normal consistency and time of setting of a Portland cement sample
- Prepare and test cement mortar samples to determine compressive strength and compare results with ASTM specifications

- Test a coarse aggregate sample to determine its particle size distribution and plot results on a semi-log graph
- Determine specific gravity and absorption capacity of a coarse aggregate
- Determine unit weight and air void in compacted and loose coarse aggregate
- Mix a batch of concrete using mechanical mixer and prepare cylindrical and beam specimens
- Test freshly mixed concrete to determine its slump, air content and unit weight
- Test cylindrical specimens of concrete to determine compressive strength
- Test beam specimens of concrete to determine flexural strength
- Determine penetration value of asphalt cement
- Determine viscosity properties of cutback asphalt
- Determine stability and flow values of compacted hot mix asphalt specimens
- Compact and evaluate properties of hot mix asphalt using Superpave Gyratory Compactor
- Determine asphalt content of asphalt mix using Ignition oven
- Test rebar to determine yield and tensile strength
- Determine flexural strength of a wood specimen

**COURSE OUTLINE:**

1. To determine specific gravity and absorption properties of a coarse aggregate sample
2. To test coarse aggregate sample to determine its unit weight and voids in compact and loose state
3. To mix a Portland cement concrete batch and determine slump properties
4. To prepare cylindrical and beam specimens of freshly mixed Portland cement concrete
5. To determine compressive strength of concrete using cylindrical samples
6. To determine flexural strength of concrete using beam specimen
7. To determine splitting tensile strength of concrete using cylindrical samples
8. To determine penetration value of an asphalt cement sample
9. To determine viscosity value of a cutback asphalt sample
10. To determine Marshall stability and flow values of compacted hot mix asphalt
11. To determine engineering properties of hot mix asphalt using Superpave Gyratory Compaction equipment
12. To determine asphalt content of a hot mix asphalt sample
13. To test a steel rebar to determine yield and tensile strength
14. To test a wood sample to determine flexural strength

**GRADING STANDARD:**

Attendance and or/Homework	30%	A	(100-90)%
Lab participation & report	60%	B	(89-75)%
Final Assessment	15%	C	(74-65)%
		D	(64-50)%



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Mechanical Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:**           **MECH-406: Engineering Economics [3 Credit Hr]**

**PRE/CO-REQ:**       Senior standing

**COURSE TYPE:**     Required Course

**CATALOG DATA:** Studies the application of economic principles to engineering problems and their effect on engineering decision-making.

**TEXT BOOK:**        Engineering Economic Analysis by Donald G. Newnan, Jerome P. Lavelle, and Ted G. Eschenbach, Latest Edition, Oxford University Press.

**INSTRUCTOR:**     Stephen Arhin, Ph.D., P.E., PTOE,  
Assistant Professor, Building 42/213D  
Tel: 202-274-6600 Email: [sarhin@udc.edu](mailto:sarhin@udc.edu)

**OFFICE HOURS:**    Upon request

**INSTRUCTIONAL FORMAT:**    Classroom Lecture

**LECTURES:**        Tuesday       4:00 – 5:20 PM       42/210  
                          Thursday      4:00 – 5:20 PM       42/210

**COURSE OBJECTIVES:**

The objective of Engineering Economics course is to prepare an engineering student to use economic principles and cost analysis of engineering projects. The student will learn interest formulas, how to compare different engineering projects using present worth method, future value method, annual payment method and benefit-cost technique. The student will also be able to calculate depreciation of an asset and its effect on after tax cost.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Do simple and compound interest calculations to determine present & future worth, interest periods and interest rates
- Perform calculations involving uniform series, arithmetic series, geometric series
- Compare alternative engineering projects using present worth analysis, future worth analysis and annual payment analysis techniques

- Perform benefit-cost and incremental benefit-cost analysis of competing engineering projects
- Perform depreciation calculations of assets to determine book values and income taxes.

**COURSE OUTLINE:**

1. Introduction, cost estimation and engineering economics terminology
2. Interest and Equivalence
3. Equivalence for Repeated Cash Flows
4. Present Worth Analysis
5. Annual Cash Flow Analysis
6. Rate of Return Analysis
7. Choosing the Best Alternative
8. Benefit-Cost Analysis
9. Depreciation
10. Selection of Minimum Attractive Rate of Return

**GRADING STANDARD:**

Exam 1	22.5%	A – 90 to 100 points
Exam 2	22.5%	B – 80 to 89 points
Exam 3	22.5%	C – 70 to 79 points
Final Exam	22.5%	D – 60 to 69 points
Homework & Attendance	10%	F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:** CVEN-419 Design of Concrete Structures [3 Credit Hr]

**PRE/CO-REQ:** Pre-Req: CVEN-311 Theory of Structures Lecture

**COURSE TYPE:** Required Course

**CATALOG DATA:** Design of Concrete Structures covers the analysis and design of reinforced concrete rectangular and T-beams, one-way slabs, short and slender (long) columns, spread footings, and wall footings.

**TEXT BOOK:** Jack C. McCormac, DESIGN OF REINFORCED CONCRETE, 8th Edition, John Wiley and Sons, 2001 (ISBN 0-471-395-765)  
ACI 318-2005 Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute, 2005  
References: Edward G. Nawy, REINFORCED CONCRETE, 5th Edition, Prentice-Hall, 2008.  
Arthur H. Nilson, DESIGN OF CONCRETE STRUCTURES, 12th Edition, McGraw-Hill, 1997

**INSTRUCTOR:** Ahmet Zeytinci, Ph.D., P.E., Fellow NSPE, Professor  
Building: 42/213-H, Email: [azeytinci@udc.edu](mailto:azeytinci@udc.edu), Phone: 202-274-6186

**OFFICE HOURS:** T, Th 3:30 - 4:30 PM, W 10:00 AM - 2:00 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Tuesday 12:30 – 1:50 PM 42/114B  
Thursday 12:30 – 1:50 PM 42/114B

**COURSE OBJECTIVES:**

The primary objective of Reinforced Concrete Design is to furnish the student with a basic understanding of the strength and behavior of reinforced concrete members and simple concrete structural systems.

- Material, Design Codes, Loads
- Design of R/C Beams and One-Way Slabs for Flexure
- Design of Axially Loaded Short and Slender Columns
- Design of Eccentrically Loaded Short and Slender Columns
- Design of Wall Footings and Spread Footings

## STUDENT LEARNING OUTCOMES:

Upon completion of the course the student will be able to:

- Analyze and design singly and doubly reinforced concrete beams under flexure, including regular (rectangular shaped) and T-beams
- Analyze and design structural concrete beams subjected to shear loading
- Conduct a service load analysis to control deflection and cracking of beams
- Analyze and design reinforced concrete columns and develop moment-axial load interaction curves
- Determine bond length, lap splice and detailing requirements for reinforced concrete members
- Analyze and design isolated and combined footings
- Analyze and design cantilever retaining walls

## COURSE OUTLINE:

1. Introduction, Classification of Structures
2. Building Codes and Specifications, ACI, AISC
3. Service Loads and Factored Loads,  $DL$ ,  $LL$ , Wind Loads &  $EQ-L$
4. Strength Analysis of Beams According to ACI (318-11)
5. Design of Rectangular Beams and On-Way Slabs
6. Design of R/C Cantilever Beams and Continuous Beams
7. Analysis and Design of T-Beams and Doubly Reinf. Beams
8. Serviceability and Bond-Development Lengths, Code Provisions
9. Analysis of Shear and Diagonal Tension, ACI Requirements
10. Design of Short Columns, Axial Load Capacity, Design Formulas
11. Analysis of Statically Indeterminate Beams and Frames
12. Two Way Slabs, Direct Design Method, Column/Middle Strips
13. Analysis and Design of Wall Footings and Spread Footings
14. Analysis and Design of R/C Cantilever Retaining Walls
15. Computer Models & Analysis of Trusses, Beams, Frames
16. Analysis of Various Structures using ISSAS & BEAM-2D

## GRADING STANDARD:

Mid-term Test	20%	A – 90 to 100 points
Final Test	20%	B – 80 to 89 points
Homework & Attendance	20%	C – 70 to 79 points
Quizzes	40%	D – 60 to 69 points
		F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** CVEN-435: Foundation Design Lec. [3 Credit Hr]

**PRE/CO-REQ:** CVEN 331 Geotechnical Engineering,

**COURSE TYPE:** Required Course

**CATALOG DATA:** Principles of Geotechnical Engineering. Credits 3.  
Studies properties and uses of common civil engineering materials, such as, cement, aggregates, concrete, asphalts, asphalt mixes, steel and wood. Design techniques of Portland cement concrete mix and hot mix asphalts. Lec. 3 hours.

**TEXT BOOK:** Braja M. Das, Principles of Foundation Engineering, Seventh Edition, Cengage Learning.

**Reference Materials:**

- Salgado, R., The Engineering of Foundations, McGraw-Hill
- Coduto, D.P., Foundation Design: Principles and Practices, Prentice-Hall
- Terzaghi, Karl and Peck, Ralph, Soil Mechanics in Engineering Practice, John Wiley

**INSTRUCTOR:** Inder J. Bhambri, Professor (taught by Dr. Balehager Ayalew, Adjunct)  
Building 42/C-10C, Tel: 202-274-6327  
Email: [ibhambri@udc.edu](mailto:ibhambri@udc.edu)

**OFFICE HOURS:** Upon request

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Tuesday 4:00 – 5:20 PM 42/210  
Thursday 4:00 – 5:20 PM 42/210

**COURSE OBJECTIVES:**

Learning goal of Foundation Design course is to prepare a civil engineering student to determine and interpret subsurface soil properties, familiarize him/her with different types of shallow foundations, their design procedures in consideration of bearing capacity & soil compressibility; lateral earth pressures and design of retaining walls, types and design techniques of braced cuts, and introduce them to different types of pile foundations.

**Learning Outcomes:**

Upon completion of the course the student will be able to:

- Plan soil exploration of a site for a design of a building foundation
  - Interpret soil field data and read boring logs
  - Use various bearing capacity equations to calculate bearing capacity of a soil mass for a given footing
  - Calculate elastic and consolidation settlement of foundations
  - Design a shallow foundation to carry a given load and for given soil conditions
  - Calculate earth pressure at-rest, active earth pressure and passive earth pressure for a given soil mass
  - Design a retaining wall to support a soil mass
  - Perform stability analysis of a retaining wall for sliding, overturning and foundation failure
  - Analyze a braced cut and calculate forces in its members
- Understand different types of pile foundations.

**COURSE OUTLINE:**

1. To review geotechnical properties of soils, such as, types, index properties, classification systems, soil stresses, shear strength, and soil settlement properties
2. To understand soil exploration techniques, sampling techniques, boring logs, and interpretation of soil properties obtained from soil exploration
3. To understand types of shallow foundations, bearing capacity of shallow footings using Terzaghi equation, Meyerhof's general bearing capacity equations and other equations
4. To calculate elastic and consolidation settlements of footings
5. To design continuous, square, circular and rectangular shallow foundations
6. To design of mat and combined foundations
7. To design floating foundations
8. To determine lateral earth pressure at-rest, active earth pressure, and passives earth pressure of cohesive and cohesion-less soils.
9. To design masonry and reinforced concrete retaining walls to withstand applied earth pressure
10. To analyze and design braced cuts
11. To introduce students to different types of pile foundations and design procedures

**GRADING STANDARD:**

Attendance and or/Homework	10%	A	(100-90)%
Exam # 1	22.5%	B	(89-75)%
Mid-term Evaluation	22.5%	C	(74-65)%
Exam # 2	22.5%	D	(64-50)%
Final Exam	22.5%		



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:** CVEN-442: Water Resources Engineering Lecture [3 Credit Hr]

**PRE/CO-REQ:** Pre-Req: CVEN-325 Hydrology & Hydraulics

**COURSE TYPE:** Required Course

**CATALOG DATA:** The purpose of this course is to get an understanding of water resources engineering, a particular emphasis on urban water resources systems. The field of water resources engineering covers the design of systems to control the quantity, quality, timing and distribution of water to support both human habitation and the needs of environment..

**TEXT BOOK:** Hydrology and Hydraulic Systems, by Ram S. Gupta  
Third Edition, Waveland Press, Illinois, 2007 (ISBN 1-57766-455-8)  
*Instructor will supplement with course notes*  
References: Water Resources Engineering by David A. Chin, Prentice Hall, ISBN 0-13-148192-4

**INSTRUCTOR:** Pradeep K. Behera, Ph.D., P.E., D. WRE  
Building: 42/213F, Email: [pbehera@udc.edu](mailto:pbehera@udc.edu) , Phone: 202-274-6186

**OFFICE HOURS:** M 11:00-12:00 PM, T 10:00 AM-2:00 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:**

Monday	12:30 – 1:50 PM	42/107
Wednesday	12:30 – 1:50 PM	42/107

**COURSE OBJECTIVES:**

The purpose of this course is to get:

- To familiarize students with urban water systems including water supply system, storm water management system, waste water systems and erosion and sediment control
- To familiarize with water resources engineering problems, legal aspects, regulatory requirements, watershed based planning concepts
- To understand the urban drainage problems, storm sewer and combined sewer system problems and their evolution, urban storm water management strategies

- Ability to plan and design a storm water management systems for a community which include planning and design a storm sewer system estimating design flows, sizing of sewer systems and other design details
- Ability to plan and design a water supply systems for a community which include planning concepts, water demand analysis, population forecasting, calculation of design flows, and sizing of pipe systems, evaluation of flow and head within a pipe systems
- Ability to plan and design a sanitary sewer systems for a community which include planning and design a wastewater sewer system by estimating design flows, sizing of sewer systems and other design details
- Understand the engineering principles for pumps, pump characteristics and performance
- To understand the engineering principles for erosion and sediment control during a construction

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Explain key components of urban water systems and how these systems are conceptualized during definition of the problem, planning, and design concepts in solving the water resources engineering problems
- Plan a storm water management system for a community and able to estimate the design flows, design the storm sewer systems, storage and treatment systems
- Plan a water supply system for a community and able to conduct a water demand analysis, estimate the design flows, design the pipe systems, conduct a flow performance analysis
- Plan a wastewater collection system for a community and able to estimate the design flows, design the wastewater sewer systems and other design details
- Estimate the pump characteristics and performance
- Determine the planning and design requirements for the development of an erosion and sediment control plan for a site

**COURSE OUTLINE:**

1. Introduction to Urban Water Systems
2. Urban Stormwater Management
3. Urban Storm Sewer Systems
4. Drinking Water Supply Systems - Design and Analysis
5. Urban Wastewater System Designs
6. Erosion and Sediment Control

**GRADING STANDARD:**

Assignments/Quiz Tests	40%	A – 90 to 100 points
Final Test	30%	B – 80 to 89 points
Design Project	10%	C – 70 to 79 points
Class Attendance &		D – 60 to 69 points
Participation	20%	F – less than 60 points

F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** **CVEN-452: Urban Transport Systems Design [3 Credit Hr]**

**PRE/CO-REQ:** Senior standing

**COURSE TYPE:** Required Course

**CATALOG DATA:** This course is intended as an introductory transportation class for civil engineering students. The course is structured on the basic objective to motivate students to pursue a deeper understanding of transportation system facilities and the design components.

**TEXT BOOK:** Jon D. Fricker and Robert K. Whitford, Fundamentals of Transportation Engineering: A Multimodal Systems Approach, Prentice Hall, 2004, (ISBN: 0130351245)  
*Instructor will supplement with course notes*

**INSTRUCTOR:** Stephen Arhin, Ph.D., P.E., PTOE,  
Assistant Professor, Building 42/213D  
Tel: 202-274-6600 Email: [sarhin@udc.edu](mailto:sarhin@udc.edu)

**OFFICE HOURS:** Thursday 5:30-6:30 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Monday 4:00 – 5:20 PM 42/210  
Wednesday 4:00 – 5:20 PM 42/210

**COURSE OBJECTIVES:**

This course is intended as an introductory transportation class for all interested engineering and science students. The course is structured upon the basic objective to motivate students to pursue a deeper understanding of transportation systems. To facilitate this, the course requires the students to have some background in basic computer skills such as spreadsheets (excel), data analysis and calculus. Students are expected to be able to conduct capacity analyses of roadway facilities (freeways, 2-lane roadways, etc.), design a roadway alignment at the end of the course

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Understand critical elements of transportation Engineering including planning, analysis and design
- Understand the basic definitions, tools and methods for the planning, operation and design of highway systems
- Understand the basic concepts, tools and methods for the conduct of transportation engineering studies

**COURSE OUTLINE:**

1. Introduction – Transportation Basics
2. Traffic Flow Theory and Analysis
3. Transportation Planning
4. Highway Capacity and Level of Service Analysis
5. Highway location and Geometric Design
6. Fundamentals of Intersection Control and Design
7. Introduction to Pavement Design
8. Intelligent Transportation Systems

**GRADING STANDARD:**

Exam 1	20%	A – 90 to 100 points
Exam 2	20%	B – 80 to 89 points
Final Exam	30%	C – 70 to 79 points
Homework/Quizzes/Paper/Presentations	25%	D – 60 to 69 points
Attendance	5%	F – less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**SPRING 2014**

**COURSE**

**SYLLABUS:** Special Topics in CE./CVEN 454 Traffic Engineering [3 Credit Hr]

**PRE/CO-REQ:** Senior standing

**COURSE TYPE:** Required Course

**CATALOG DATA:** This course is mainly oriented towards engineering students interested in learning the fundamentals traffic engineering studies. The course is structured on the basic objective for students to be able to conduct several traffic engineering studies. To facilitate this, the course requires the students to have some confidence in basic computer skills such as spreadsheets (excel), data analysis and basic undergraduate mathematics and statistics. Students are expected to actively participate in the class. Experiential learning and team work is emphasized throughout the course.

**TEXT BOOK:** Institute of Traffic Engineers, Traffic Engineering Handbook, Roses, R.P.; Prassas, E.S., McShane, W.R., Fourth Edition, Traffic Engineering, 2010, (ISBN: 978-0136135739)  
*Instructor will supplement with course notes*

**INSTRUCTOR:** Stephen Arhin, Ph.D., P.E., PTOE,  
Assistant Professor, Building 42/213D  
Tel: 202-274-6600 Email: [sarhin@udc.edu](mailto:sarhin@udc.edu)

**OFFICE HOURS:** Tues and Thurs 4:00 - 5:00 PM

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:**

Tuesday	5:30 – 6:30 PM	42/210
Thursday	4:00 – 5:20 PM	42/210

**COURSE OBJECTIVES:**

Students completing this course are expected to be able to:

- Understand critical elements of Traffic Engineering
- Understand the basic definitions, tools and methods for the planning, operation and design of traffic systems
- Understand the basic concepts, tools and methods for the conduct of traffic engineering studies

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Understand critical elements of Traffic Engineering
- Understand the basic definitions, tools and methods for the planning, operation and design of traffic systems
- Understand the basic concepts, tools and methods for the conduct of traffic engineering studies

**COURSE OUTLINE:**

1. Driver and Pedestrian Characteristics
2. Traffic and Vehicle Operating Characteristics
3. Traffic Studies: Inventories (condition diagrams), Volume, Speed, Travel Time Delay
4. Traffic Studies: Traffic Stream Studies, Intersection, pedestrian, parking
5. Traffic Safety Analysis
6. Basic Principles of Intersection Signalization and Signal Timing
7. Intersection Capacity Analysis
8. Elements of Traffic Signal Design and Layout
9. Traffic Impact Studies
10. Traffic Signs and Markings (Introduction to MUTCD)

**GRADING STANDARD:**

Mid-term Examination	25%	A – 90 to 100 points
Mid-term Project	25%	B – 80 to 89 points
Final Project and Presentation	40%	C – 70 to 79 points
Homework & Attendance	10%	D – 60 to 69 points
		F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** **CVEN-464: Engr. Ethics and Professional Practice [3 Credit Hr]**

**PRE/CO-REQ:** Senior standing

**COURSE TYPE:** Required Course

**CATALOG DATA:** This course is designed to provide engineering students with a review of their ethical responsibilities. The course begins by examining the requirement for a professional code of ethics to assist students in the conduct of their daily practice and concludes with a discussion of the moral and ethical foundations used in building that code. The course discusses entertaining case studies from engineering professional life.

**TEXT BOOK:** Mike W. Martin and Roland Schinzinger, Ethics in Engineering, 4th Edition, McGrawHill, (ISBN 007-2831154)

**INSTRUCTOR:** Stephen Arhin, Ph.D., P.E., PTOE,  
Assistant Professor, Building 42/213D  
Tel: 202-274-6600 Email: [sarhin@udc.edu](mailto:sarhin@udc.edu)

**OFFICE HOURS:** Upon request

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Tuesday 4:00 – 5:20 PM 42/210  
Thursday 4:00 – 5:20 PM 42/210

**COURSE OBJECTIVES:**

The course objective of this course is to

- understand the concept of a profession and a professional's responsibility to the general public, clients, employers, and peers;
- understand the need for a professional engineering code of ethics;
- understand the building blocks used in developing professional codes.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- understand the concept of a profession and a professional's responsibility to the general public, clients, employers, and peers;
- understand the need for a professional engineering code of ethics;
- understand the building blocks used in developing professional codes.

**COURSE OUTLINE:**

A. Need for professional standards in the insurance industry

1. Establishing expectations of behavior
2. NSPE Code of Engineering Ethics

B. The role of professional ethics

1. Professional standards and the business process
2. Difference between morality and ethics

C. Characteristics of a profession

1. Possession of unique knowledge
2. Responsibility to public
3. Licensed by state
4. High ethical standards
5. Public standing

D. The basis of professional ethics

1. The role of public law
2. The inadequacy of laws
3. Philosophical bases for ethical standards
  - a. Cultural subjectivism
  - b. Moral objectivism
  - c. Utilitarianism
4. Reciprocity and the Golden Rule

**GRADING STANDARD:**

Exam 1	22.5%	A – 90 to 100 points
Exam 2	22.5%	B – 80 to 89 points
Exam 3	22.5%	C – 70 to 79 points
Final Exam	22.5%	D – 60 to 69 points
Homework & Attendance	10%	F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** **CVEN-475: Project Planning and Scheduling [3 Credit Hr]**

**PRE/CO-REQ:** Senior standing

**COURSE TYPE:** Required Course

**CATALOG DATA:** Studies the application of economic principles to engineering problems and their effect on engineering decision-making.

**TEXT BOOK:** Jimmie W. Hinze, "Construction Planning and Scheduling", Third Edition, Pearson/Prentice Hall, 2008  
Chris Hendrickson and Tung Au, "Project Management for Construction" Prentice Hall, (ISBN 0-13-731266-0)

**INSTRUCTOR:** Stephen Arhin, Ph.D., P.E., PTOE,  
Assistant Professor, Building 42/213D  
Tel: 202-274-6600 Email: [sarhin@udc.edu](mailto:sarhin@udc.edu)

**OFFICE HOURS:** Upon request

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Tuesday 4:00 – 5:20 PM 42/210  
Thursday 4:00 – 5:20 PM 42/210

**COURSE OBJECTIVES:**

The objective of this course is to develop the ability to understand the planning and scheduling of construction phase of various types of civil engineering projects. In particular, students are expected to be able to develop project network diagrams using modern software programs and conduct CPM and PERT analyses.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- Develop the project planning, project breakdown, and activity relationships. Construct a project network model using the Activity-on-Arrow (Arrow) network, Activity-on-Node (Precedence) network diagrams, and Program Evaluation & Review Technique (PERT) network

- Perform critical path analysis for project scheduling, using the ARROW network
- Perform critical path analysis for project scheduling, using the PRECEDENCE network
- Perform a critical path analysis for project scheduling, using the PERT network.
- Explain time-cost analysis (trade-offs) and perform project time reduction using the cost-slope method
- Explain the resource allocation and leveling needs of a project.

**COURSE OUTLINE:**

1. Introduction/Overview
2. Developing Network Diagrams
3. Work Breakdown Structure/Precedence Diagrams
4. Arrow Diagrams
5. Determining Activity Durations
6. Critical Path Method (CPM) and PERT
7. Time in Contracts Provisions
8. Project Control and Monitoring
9. Earned Value
10. Linear Scheduling

**GRADING STANDARD:**

Exam 1	22.5%	A – 90 to 100 points
Exam 2	22.5%	B – 80 to 89 points
Exam 3	22.5%	C – 70 to 79 points
Final Exam	22.5%	D – 60 to 69 points
Homework & Attendance	10%	F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013**

**COURSE**

**SYLLABUS:** **CVEN 476: Construction Project Management [3 Credit Hr]**

**PRE/CO-REQ:** Senior standing

**COURSE TYPE:** Required Course

**CATALOG DATA:** This course covers elements of management as related to construction projects; responsibilities of construction managers, on-site representatives, engineers and inspectors; concept of developing the project team approach.

**TEXT BOOK:** Construction Project Management, 4/E by Frederick Gould and Nancy Joyce, 2013, (ISBN-10: 0132877244)

**INSTRUCTOR:** Stephen Arhin, Ph.D., P.E., PTOE,  
Assistant Professor, Building 42/213D  
Tel: 202-274-6600 Email: [sarhin@udc.edu](mailto:sarhin@udc.edu)

**OFFICE HOURS:** Upon request

**INSTRUCTIONAL FORMAT:** Classroom Lecture

**LECTURES:** Tuesday 4:00 – 5:20 PM 42/210  
Thursday 4:00 – 5:20 PM 42/210

**COURSE OBJECTIVES:**

The objective of this course is to develop students' ability to understand the construction phase of engineering and to identify the role of a Construction Manager of a project. At the end of the course, students should be able to also perform planning and scheduling tasks, the types of construction contracts, and the various phases in the construction process.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

- The project delivery system, responsibility and authority, and resident representative office responsibilities
- Records and reports, specifications and drawings, and using the specification in the contract administration

- Construction laws and labor relations; construction safety, meetings and negotiations, and risk allocation and liability sharing
- Preconstruction operations, planning for construction, and CPM scheduling for construction
- Construction operations, and value engineering
- Measurement and payment, and construction materials and workmanship
- Changes and extra work, claims and disputes, and project closeout [g]

**COURSE OUTLINE:**

1. The Construction Industry
2. Project Participants
3. Organizing and Leading the Construction Project
4. Project Delivery Methods
5. Project Chronology
6. Construction Services during Design
7. Bidding and Procurement
8. Construction and Closeout
9. Estimating Project Costs
10. Project Planning and Scheduling
11. Controlling Project Cost, Time, and Quality
12. Construction Safety and Health

**GRADING STANDARD:**

Exam 1	22.5%	A – 90 to 100 points
Exam 2	22.5%	B – 80 to 89 points
Exam 3	22.5%	C – 70 to 79 points
Final Exam	22.5%	D – 60 to 69 points
Homework & Attendance	10%	F – Less than 60 points



**UNIVERSITY OF THE DISTRICT OF COLUMBIA**  
**School of Engineering and Applied Sciences**  
**Department of Civil Engineering**  
**FALL 2013, SPRING 2014**

**COURSE**

**SYLLABUS:**           **CVEN 491: CE Senior Project I [3 Credit Hr]**  
                              **CVEN 492: CE Senior Project II [3 Credit Hr]**

**PRE/CO-REQ:**       Senior standing

**COURSE TYPE:**    Required Course

**CATALOG DATA:** Civil engineering system planning, analysis and creative design, problems formulation, recognition of need, design constraints and requirements, feasibility assessment, and design of civil systems. Provide group projects for senior students to design civil engineering systems. Oral presentations and written report are required.

**TEXT BOOK:**       No Specific Text Books, Design Manuals, Civil Engineering Design Handbook, Civil Engineering Codes, and Design Text books

**INSTRUCTOR:**     Dr. Pradeep Behera, PE, DWRE  
                              Dr. Ahmet Zeytinci, PE, FNSPE

**OFFICE HOURS:**   Upon request

**INSTRUCTIONAL FORMAT:**   Classroom Lecture

**LECTURES:**       Monday, 9.30 – 10.50 AM (Bldg. 42, Room 209 and 42/111)  
                              Wednesday, 9.30 – 10.50 AM (Bldg. 42, Room 209 and 42/111)

**COURSE OBJECTIVES:**

The objective of this course is to develop ability to formulate, analyze and solve civil engineering problems through creative thinking, engineering education and using the principles of technical and professional practices. The students will apply the foundational knowledge and skills from the science and mathematics courses, engineering principles from the technical and professional courses to solve the civil engineering planning, analysis and design problems.

**STUDENT LEARNING OUTCOMES:**

Upon completion of the course the student will be able to:

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- Understand the problem, client’s needs, regulatory requirements,
- Analyze needs to produce problem definition for civil engineering systems
- Carry out design process (synthesis, modeling, feasibility evaluation, iteration) to satisfy project requirements
- Work within realistic constraints, (such as economic, environmental, societal, manufacturability, safety, ethical) in realizing systems
- Share responsibilities and information on schedule with others on team
- Participate fully in the development and selection of design problem
- Evaluate ethical issues that may occur in professional practice using professional codes of ethics
- Produce progress reports, memos, project reports both formal and informal, recording and maintaining an engineering journal
- Plan, prepare, and deliver well-organized, logical oral presentations
- Recognize the societal and global changes that engineering innovations may cause
- Use design software for engineering applications

**COURSE OUTLINE:**

The course has different components that require individual effort as well as team effort to solve problems and will be spanned over two semesters. Students are required to discuss with faculty members about their specific interests/ specific civil engineering topics. The project topics for both fall and spring semester will be finalized within first three weeks of the fall semester. Students are required to prepare a task and time chart for completing the projects. At this point we are anticipating there will be four projects comprising of (i) one small project (small site development), (ii) one medium size project (Hydraulic analysis) and (iii) a large project (land development of approximately 30 acres and a structural engineering project). The structural engineering project will be part of large land development project. The land development project will include Feasibility study, Client need assessment, Geotechnical analysis, Permit process, Design of stormwater system. Design of sanitary sewer system, Design of water supply system, Design of Stormwater management, Road layout, Structural design (preferably a multistoried building). In addition, students will be given weekly tasks to read civil engineering articles and small assignments on AutoCad to develop their communication and technical skills. This introductory concepts of sustainability engineering will be provided in the class and will be applied in the projects.

**GRADING STANDARD:**

Discussion & Creativity	10%	A – 90 to 100 points
Analysis and Design	50%	B – 80 to 89 points
Engineering Report	20%	C – 70 to 79 points
Oral Presentation	10%	D – 60 to 69 points
Class Participation	10%	F – Less than 60 points

