University of Southern California
CE 599: Special Topics in Civil Engineering:
Software Based Civil Engineering Design
Fall, 2011

Administrative Matters

- Location: A Viterbi School of Engineering computerized classroom in RTH, GER or OHE to be determined.
- Day and time: A total of six days of intensive instruction executed during three weekends during the fall semester:
  - Saturday, September 24 9:00 AM – 5:00 PM
  - Sunday, September 25 9:00 AM – 5:00 PM
  - Saturday, October 15 9:00 AM – 5:00 PM
  - Sunday, October 16 9:00 AM – 5:00 PM
  - Saturday, November 5 9:00 AM – 5:00 PM
  - Sunday, November 6 9:00 AM – 5:00 PM
- Text: *The Zen Guide to InRoads V8i, V8.11 Essentials Workbook*
- Professor and contact information:
  - Mark S. Ditko
  - Office and office hours:
    - Classroom 8:00 AM – 9:00 AM, 5:00 PM – 6:00 PM on class days, or telephonically by appointment
  - Phone and email
    - Cell: 818.516.1091
    - Wk: 818.367.2485
    - Mark@InRoadsGuru.com
- Prerequisites or preparation needed to succeed
  - Prerequisites:
    - Students should have some basic familiarity with a CAD package such as MicroStation or AutoCAD. If this is not the case, then the student attending this class may have to compensate for this by either investing some extra time outside of class to ensure they complete the class assignments, or devote some lab time prior to this class to increase their fluency with MicroStation. To this end, the MicroStation software is delivered with a set of self-paced tutorial exercises that can worked through to increase one’s proficiency and comfort with the software. It’s important to note that this class is not focusing on the use of MicroStation and does not deem it as a critical skill required to complete the objectives of this particular class.
    - Students should have at least some understanding of the Civil Engineering industry, and conceptually have a slight grasp of the basic tasks associated with grading design and specifically roadway related tasks such as alignment geometry (both horizontal & vertical), profiling, earthwork, and cross sectioning. For those with little to no prerequisite knowledge in some of these areas, it will be important that you inform the instructor well before, or just prior to when those topics are taught so that this lack of exposure can be appropriately addressed. If most, or all of the previously mentioned Civil topics are foreign to the potential student it may very difficult for that student to properly correlate the utilization of the software with its application in the Civil industry. If you are in doubt as to whether or not you have the prerequisite knowledge to successfully complete and achieve the results of this class, please contact either an advisor or the instructor to discuss it in more detail.
Advance Preparation for the intensive format:

- Students should read through Section 1 of “The Zen Guide to InRoads V8i, V8.11 Essentials Workbook” and work through the exercises in Chapter 1-4 in advance of the first class meeting. The software will be available in a Viterbi School facility to be arranged.

Introduction and Purpose of the Course

This course will have a “Lecture – Lab” format. Each chapter in Section 2 of the book will start out with a lecture / discussion of that particular area of the software. All nine chapters in Section 2, from 2-1 to 2-9, will be covered in this class. Following the lecture / discussion portion of the class the students will work through the exercises. Each student is expected to complete that chapter work within the designated time period provided. This is a very structured class. In most cases the completed chapter material will be utilized in the subsequent chapter and will become prerequisite information needed before moving forward.

The general purpose of this course is to:

1. Orient the students to the InRoads software and introduce them to its capabilities to support the design of roadways.
2. Provide the students with sufficient guided, hands-on experience for them to gain comfort and familiarity with the software and its application to the sort of engineering problems for which it was designed.
3. Generate understanding and discussion of the use of this software within standard, professional civil and transportation engineering work processes.

This class will cover all of the key areas within the InRoads software package, including:

1. Understanding the software menus and interface
2. Configuring the software for effective use
3. Creating ‘intelligent’ 3D surface models (DTMs)
4. Laying out horizontal geometry with the software
5. Profile creation and capabilities
6. Laying out vertical geometry with the software
7. In-depth understanding of typical section design within the software
8. Roadway model creation
9. Cross section creation
10. Earthwork volume generation

One of the strengths of this class is the lecture / discussion portion. Due to the intensive nature of the course, attending each lecture is vital to the success of this class. If a student is unable to attend a portion of the schedule, the instructor should be contacted to assess the impacts. It may be possible that a custom recovery plan could be developed in some instance; however it should be noted that absences can only detract from the overall grasp of the material.

Course Requirements

- Text
  - The students are required to purchase “The Zen Guide to InRoads V8i, V8.11 Essentials Workbook.”
  - By the end of the course the students will be expected to have read and completed all of the chapter exercises in the workbook.
- Readings: See the attached Course Schedule for details on the class topics.
Grades

- Grading breakdown
  - There will be a morning quiz each day. The first day the quiz will be written, whereas each subsequent morning the quizzes will be oral and will consist of specific questions asked to each of the students. These morning quizzes will count for 10% of the course grade.
  - There will be a mid-term examination on the afternoon of the fourth day on October 16. This will be a hands-on test involving software. This test will account for 10% of the course grade.
  - There will be a final examination at the end of the class on November 6. This will be a written test during which the students will be allowed access to any personal notes, the software, and any other class materials available to them. Students may use any resource except another student. This test will account for 10% of the course grade.
  - The bulk of the class grade (70%) will be accounted for by the homework exercises, which will be initiated together in class and submitted subsequently. The instructor will determine these grades after each student has completed the required exercises. The percentage of the grade for each chapter will be as follows:
    - Chapter 2-1: 5% September 24
    - Chapter 2-2: 5% September 24
    - Chapter 2-3: 10% September 25
    - Chapter 2-4: 10% October 15
    - Chapter 2-5: 10% October 15
    - Chapter 2-6: 5% October 16
    - Chapter 2-7: 10% October 16, November 5
    - Chapter 2-8: 10% November 6
    - Chapter 2-9: 5% November 6
  - Note, that all Chapters include a Chapter Challenge section. Only one of these Chapter Challenges will be completed as part of this class (Chapter 2-7). Any other Chapter Challenges can be completed at the discretion of the students. These will be considered for extra credit if executed correctly. All students have equal opportunities to earn extra credit.
  - Dialog and class contribution in the form of discussion are expected. This is considered an important aspect of the class. Particularly useful contributions may also be deemed a source of extra credit.

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.
# Instructional Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Day 1</th>
<th>Day 2</th>
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<td>Sept. 24</td>
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<td>Oct. 15</td>
<td>Oct. 16</td>
<td>Nov. 5</td>
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<td>9:00</td>
<td>Student Profiles; Roll; Intros</td>
<td>Question &amp; Answer and Review</td>
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<td>Pre-test</td>
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<td>10:00</td>
<td>2.1 – Starting Up</td>
<td>2.3 – Surface Essentials, (Part 1)</td>
<td>2.4 – Horizontal Geometry</td>
<td>2.6 – Vertical Geometry</td>
<td>Lab 2.7</td>
<td>2.8 – Corridor Modeling, (Part 1)</td>
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<td>Lab 2.3</td>
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<td>Mid-Term Exam</td>
<td>2.8 – Corridor Modeling, (Part 2)</td>
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<td>2.2 – Settings, Styles &amp; Symbology</td>
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<td>2.9 – Cross Sections</td>
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<td>2.5 – Profiling</td>
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<td>Lab 2.9</td>
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<td>Lab 2.2</td>
<td>2.3 – Surface Essential (Part 2)</td>
<td>2.7 – Typical Sections, (Part 1)</td>
<td>2.7 – Typical Sections, (Part 2)</td>
<td>Final Exam</td>
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<td>Class wrap-up</td>
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InRoads Topics

1. START-UP ESSENTIALS
   - InRoads versus CAD
   - The InRoads Interface
   - Customized Toolbars
   - InRoads > Tools > Options
   - Introduction to Preferences
   - Project Defaults
   - Additional Application Add-ins
   - Variable Manager

2. THE MANAGER ESSENTIALS
   - The Symbology Manager in detail
   - Introduction to Intelligent DTM’s
   - Surface Styles in detail
   - Geometry Styles in detail
   - Preference Manager
   - Manager Relationships
   - The XIN file

3. SURFACE ESSENTIALS
   - The Basic DTM Point Types
   - Surface ‘Triangulation’ Concept
   - Working with Contour data
   - Sources of 3D Surface Data
   - Loading 3D ASCII & Graphical Data
   - Surface Features & their Properties
   - Surface ‘container’ Properties
   - View Surface commands
   - Design Surface commands
   - Edit Surface commands
   - Triangle & Grid Volumes

4. HORIZONTAL ALIGNMENTS
   - Overview of the Geometry Project
   - Horizontal Geometry Layout Methods
   - Viewing the Alignment Stationing

5. PROFILES
   - Creating Profiles
   - Profile Surface Symbology
   - Profile Offsets & Symbology
   - Profiling and DTM Features
   - Profile Controls
   - Updating the Profile
   - The InRoads Project File (.RWK)

6. VERTICAL ALIGNMENTS
   - Vertical Geometry Layout Methods
   - Vertical Curve Set Dynamics
   - Vertical Annotation

7. TYPICAL SECTIONS
   - Opening/Creating Typical Sections
   - The Design Roadway Workflow
   - Typical Section Basics
   - Template Library Construction
   - The Create Template Interface
   - Section Creation Fundamentals
   - Typical Section Layers & Sublayers
   - Template Points and Components
   - Adding & Editing Templates
   - Template Constraint Types
   - Cut / Fill conditions
   - The Dynamic Settings Dialog Box
   - InRoads Template Color-coding Scheme
   - End Condition Priorities
   - Alternate Surface Functionality
   - Feature Name Overrides

8. ROADWAY CREATION
   - Roadway Modeler prerequisites
   - Roadway Modeler Workflow
   - The Roadway Corridor Library
   - Defining the Roadway Model
   - The Roadway Designer Interface
   - Creating & Detailing a new Corridor
   - Editing Roadway Transition Areas
   - End Area Exceptions
   - Point Controls
   - Creating the Design Surface Model

9. EVALUATION
   - Creating Cross Sections
   - Cross Sections and DTM Features
   - Custom Cross Sections
   - The Cross Section Viewer
   - End Area Volumes
   - Considering the Components in the volume
   - Volume Adjustments & Exclusions