

Master of Engineering – Geographic Information Systems

Master of Science Civil Engineering – Geographic Information Systems

COURSE SCHEDULE

(Updated February 2008)

The following courses are being offered or planned. Check for updates to course offerings as plans are tentative and subject to change. Notes on registration guidance are appended below.

Summer 2008

1. CE 5381, Introduction to GIS (on-campus and on-line sections)

- Instructor: Fred Nuszdorfer
- Description: Provides an over-view exposure and experience with various aspects of GIS technology and its uses for natural resource and infrastructure, planning, design and management. This course involves a survey of GIS software and hardware, review of cartographic mapping principles, hands-on applications to environmental impact assessment, municipal facilities management, transportation, water resources and demographics. GIS project management factors are addressed.
- Prerequisites: graduate or upper division undergraduate standing and training in the use of personal computers; or instructor approval.
- Section 001; On-campus; 2:30 to 5:15 p.m. Mon/Wed, North Classroom Building (NC 2409).
- Section OL1 – On-line sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.

Fall 2008

1. CE 5381, Introduction to GIS (on-line section only)

- Instructor: Dr. Lynn Johnson
- Description: Provides an over-view exposure and experience with various aspects of GIS technology and its uses for natural resource

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and infrastructure, planning, design and management. This course involves a survey of GIS software and hardware, review of cartographic mapping principles, hands-on applications to environmental impact assessment, municipal facilities management, transportation, water resources and demographics. GIS project management factors are addressed.

- Prerequisites: graduate or upper division undergraduate standing and training in the use of personal computers; or instructor approval.
- Section OL1 – Online course only; open to Colorado residents and US & international non-residents (tuition schedule is different); Call numbers available in CU Denver Course Schedule Planner. Non-residents check <http://www.cuonline.edu> or call 303-556-6505 with questions.

2. CE 5382, GIS Data Development (on-campus and on-line)

- Instructor: Dr. Jacek Grodecki
- Description: Geographic information systems require development of supporting spatial and attribute databases on which to apply the required analyses. This second GIS course builds on the introductory course and addresses principles and technologies for development and conversion of spatial databases; including photogrammetry, surveying and geodesy, coordinate systems and transformations, and remote sensing. The course objectives are to: 1) introduce design concepts for GIS databases and their development, 2) review principles of geodesy and coordinate reference systems, and 3) address methods for map data collections and conversions, including tablet digitizing, scanning, remote sensing, plane surveying, photogrammetry and global positioning systems (GPS).
- Prerequisites: Calculus II, Fundamentals of Computing, Statistics, Surveying and Mapping and Introduction to GIS, or their equivalent; or instructor approval.
- Section 001; On-campus; Tues/Thurs 7:00-8:15 p.m. at CU 115 www.cudenver.edu/cuonline to obtain call number for course or call 303-556-6505 for more information.
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.

3. CE 5384, GIS Management (on-campus and on-line)

- Instructor: David Murray
- Description: This course addresses aspects of GIS planning and development. These include topics of benefit-cost and financial analysis, scheduling, project management, internal and external marketing. Also, addressed are issues of GIS institutional acceptance, the role of computerized spatial data systems in decision making, application of planning techniques for accomplishing resource goals,

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administrative structure which enhances efficiency of use, and legal considerations involved with development and use of such databases.

- Prerequisites: Calculus II, and Introduction to GIS, or their equivalent; or instructor approval
- Section 001; On-campus; M W 05:30 - 06:45 p.m. at CU 340
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.

4. CE 5386, GIS Laboratory – (ArcGIS) (on-campus and on-line)

- Instructor: Scott Steigerwald
- Description: This course is designed to provide an in-depth understanding of the functionality of the ArcGIS software suite as applied to various application domains. Topic areas include a thorough review of the functionality of ArcInfo 9.x, ArcView 9.x, using ArcCatalog, ArcMap, ArcToolbox, Model Builder, Personal Geodatabase, Python programming and VBA programming. Topics covered include the wide variety of symbolization methods available in the ArcGIS programs, data queries, labeling, charting, reporting, table joins, layouts, projection and the various data sources that can be viewed with the software. The creation of spatial data is an important part of developing GIS skills. One module will deal with the advanced data editing methods and topology enforcement that are a part of ArcGIS 9.x. An introduction to the creation of personal Geodatabases will also be included in the course. Customization using Visual Basic for Applications will be reviewed during the semester. Examples of GIS system design will also be presented as well as issues that the GIS industry is currently facing will be discussed.
- Prerequisites: Calculus II, Fundamentals of Computing, Introduction to GIS, and GIS Relational Database Systems, or their equivalent; or instructor approval
- Section 001; On-campus; 9 a.m. to 2 p.m. Sat.; at FAST Lab (CU115).
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.

5. CE 58xx, Web Deployment of GIS (on-campus and on-line)

- Instructor: Greg Gunther
- Description: The mainstream use of distributed geoprocessing services and spatial data sources by application developers, GIS professionals, and GIS users is on the verge of reality. Technological advancements within the last 2 years have de-coupled GIS applications from GIS processing logic and geospatial data warehousing. While these

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concepts stem from the Information Technology Industry, it is important for future GIS professionals to be familiar with distributed computing and internet application concepts to provide effective leadership in the GIS industry. This course would provide a sound framework for these concepts, and will tools currently available including ArcGIS Server, Internet Mapping Servers (IMS), ArcIMS, J2EE and .NET frameworks, interoperability specifications defined by the OpenGIS consortium, and future ArcGIS 9.x features.

- Prerequisites: Calculus II, Fundamentals of Computing, and Introduction to GIS; or instructor approval.
- Section 001; On-campus; 5:30 to 6:45 p.m. Tues/Thurs at North Classroom Building 2409 (FEST Lab).
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.

6. CE 58xx, Natural Resources GIS (on-campus and on-line)

- Instructor: Heather Hicks
- Description: Natural Resources GIS is designed to provide students with exposure to practical applications of computerized Geographic Information Systems (GIS) in environmental assessment, natural resource management, and natural hazard assessment. Emphasis will be placed on the types of applications and analytical techniques in natural resources and hazards fields where GIS is commonly used as a mapping and analytical tool. Environmental areas include: wildlife applications; fire response; water resources; climate; karst landscapes; geologic studies; natural hazards, such as tsunamis, earthquakes, floods, hurricanes, and landslides; and technical requirements such as project and data management, standards, visualization, and modeling.
- Prerequisites: Fundamentals of Computing and Introduction to GIS; or instructor approval.
- Section 001; On-campus; 9:00 a.m. to noon, Sat at CU 340
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.

7. CE 2212, Plane Surveying (on-campus and on-line)

- Instructor: Apostol Panayotov
- Description: Observation, analysis, and presentations of basic linear, angular, area, and volume field measurements common to civil engineering endeavors.
- Prerequisites (or co-requisite): Calculus I (e.g. MATH 1401).

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- Section 001; On-campus; Tues 07:00 to 08:50 p.m. at North Classroom Building 2409; Sat. 08:00 a.m. to 2:00 p.m. at NC 2409. Students attend lab every other Saturday.
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.
- Required prerequisite for MEng-GIS and MSCE-GIS degree.

Spring 2009

1. CE 5381, Introduction to GIS (on-line section only)

- Instructor: Dr. Lynn Johnson
- Description: Provides an over-view exposure and experience with various aspects of GIS technology and its uses for natural resource and infrastructure, planning, design and management. This course involves a survey of GIS software and hardware, review of cartographic mapping principles, hands-on applications to environmental impact assessment, municipal facilities management, transportation, water resources and demographics. GIS project management factors are addressed.
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2. CE 5383, GIS Analyses (on-campus and on-line)

- Instructor: Dr. Lynn Johnson
- Description: Course reviews GIS software functions and terminology, including data entry (input, editing), manipulation (projection, merge, window, aggregate), analysis (map algebra, overlay, Boolean, interpolation network, measurements, distance, terrain modeling, statistical analysis), query (spatial, attribute), and display/reporting. Integration of various domain- specific systems analysis models with GIS databases is also addressed. Laboratory activities involve programming applications using available GIS.
- Prerequisites: Calculus II, Fundamentals of Computing, Statistics, and Introduction to GIS or their equivalent; or instructor approval.
- Section 001; On-campus; 9:00 a.m. to noon Sat. at FAST Lab (CU115).
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers

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3. CE 5385, GIS Relational Databases (on-campus and on-line)

- Instructors: Jarrod Skulavik and Greg Bryant
- Description: Introduces database concepts with emphasis on GIS. Includes examination of relational database systems from conceptual design through relational schema design and physical implementation. Topics include database design and implementation for large database systems, transaction management, concurrency control, object-oriented and distributed database management systems.
- Prerequisites: Calculus II, Fundamentals of Computing, Statistics, Surveying and Mapping and Introduction to GIS, or their equivalent; or instructor approval.
- Section 001; On-campus at 7:00 - 9:00 p.m. Mon at North Classroom Building 2409 (FEST Lab); on-line on selected Weds.
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner:
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4. CE 5386, GIS Laboratory – Object-Oriented Programming for GIS

- Instructor: Bill Petzke
- Description: Directed to providing an in-depth experience with the use of a particular GIS software package, including ArcInfo, GRASS, or Intergraph. The course involves developing familiarity with a specific GIS software instance; its interface, data management, analysis functions and output generation. The course begins with a review of the basic commands and data structures inherent in the package. It then progresses to hands-on practice with the functions for database development, manipulation, analysis and output generation. Advanced functionality for user authoring or automation are addressed. The course includes a term project involving use of all aspects of the software package.
- Prerequisites: Calculus II, Fundamentals of Computing, Introduction to GIS, and GIS Relational Database Systems, or their equivalent; or instructor approval.
- Section 001; On-campus; 6:00 -9:00 p.m. Wed at NC 2409.
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner:
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5. CE 5387, Advanced Remote Sensing (on-campus and on-line)

- Instructor: Dr. Jacek Grodecki
- Description: This course addresses advanced concepts and methods of remote sensing. Part 1 (of 3 parts) provides an overview of remote sensing physical models, remote sensing platforms and sensors, discusses sources and types of geometric distortions and methods for correcting them, introduces image registration and re-sampling methods, presents theoretical and practical aspects of geo-referencing and geo-coding. Part 2 discusses image processing techniques, including radiometric enhancement methods, multi-spectral techniques and spatial and spectral domain image enhancement methods, and advanced concepts of multi-sensor image fusion. Part 3 introduces the theory and applications of remote sensing multi-spectral image classification. It provides a theoretical overview of feature space and feature extraction and reduction methods, concepts and methods of supervised and unsupervised classification, and then extends these concepts to the hyper-spectral data. In addition to providing a thorough theoretical background the course provides the student with hands-on-experience using ERDAS Imagine and ENVI remote sensing software.
- Prerequisites: Calculus II, Fundamentals of Computing, Statistics, Surveying and Mapping, Introduction to GIS, and GIS Spatial Data Development (or Introduction to Remote Sensing), or their equivalent; or instructor approval.
- Section 001; On-campus; 7:00 - 8:15 p.m. Tues/Thurs; at FAST Lab (CU115).
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.

6. CE 2212, Plane Surveying (on-campus and on-line)

- Instructor: Apostol Panayotov
- Description: Observation, analysis, and presentations of basic linear, angular, area, and volume field measurements common to civil engineering endeavors.
- Prerequisites (or co-requisite): Calculus I (e.g. MATH 1401).
- Section 001; On-campus; T 7:00 to 8:50 p.m. at North Classroom Building 2409; Sat. 08:00a-02:00p at NC 2409.
- Section OL1 – Online sections open to Colorado residents and US & international non-residents (tuition schedule is different); call numbers are available in the CU Denver Course Schedule Planner: < <http://courses.cudenver.edu> >. Non-residents check <http://www.cuonline.edu> e-mail help@cuonline.edu or call 303-556-6505 with questions.
- Required prerequisite for MEng-GIS and MSCE-GIS degrees.

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Notes

- On-campus sections for Introduction to GIS are offered during the Fall and Spring semesters by the Geography or Planning departments. Check course catalog for details.
- All MEng-GIS and MSCE-GIS courses use the Blackboard CourseInfo software to coordinate both on-campus and on-line classes.
- All MEng-GIS and MSCE-GIS courses use digital video web streaming technology (Adobe Breeze) which supports real time web conferencing and archival of all lectures and laboratory presentations.
- MEng-GIS and MSCE-GIS courses are conducted for both on-campus and on-line students concurrently. That is, all students are taking the same class at the same time; the only difference is that the on-line students do not get a full lecture experience, do not incur on-campus student fees, and must pay an (approx.) \$100 on-line surcharge.
- On-campus, in-state students register in the normal manner using the CU Denver Course Schedule Planner < <http://courses.cudenver.edu/> >.
- On-line (in-state and out-of-state) students register in the same manner as above, but would register for the on-line section. Check < www.cudenver.edu/cuonline > or call 303-556-6505 for more information or questions.