Faculty Course Assessment Report
North Dakota State University
Department of Construction Management and Engineering
CM&E 204, Name 204 – Construction Surveying, No. credits 2
Fall 2010 – D. Darshi De Saram

Catalog Description:
This course provides an introduction to basic surveying operations, procedures, and equipment required for building construction site organization, layout, alignment, and dimension control. Laboratory topics include: surveying fieldwork, leveling instruments, transit theodolites, total stations, GPS and GIS. Prereq: MATH 105, Construction majors only.

Grade Distribution:

A	B	C	D	F	W	Total
61	2	0	0	0	0	63

Modifications Made to Course:
This section should be evaluated in terms of how this course evolved over the past offerings.

Fall 2006 was the first time this course was offered. At that time only two 50 minute lecture sessions were available per week, part of which was used for students to conduct fieldwork. The time was insufficient, and most learning had to be done hands-on in the field. That was the very first Fall season I (hailing from just 6˚ north of the equator) had experienced in my life, and had many weather related challenges in addition to other coordination issues of conducting fieldwork.

Fall 2007, separate fieldwork sessions were added, and the lecture times were used to instruct, role-play, and discuss assignments. That provided more time for the course to be run in a more organized manner.

Fall 2008, in-depth instructional MS PowerPoint presentations were developed, and students were required to study them in their own time before the relevant fieldwork commences each week. These presentations carried many photographs and animations of the instructor and a teaching assistant conducting the fieldwork. Further many instructions were added to avoid coordination challenges encountered during fieldwork. Lecture time was used to answer questions, role-play, and to discuss important points. A quiz was given almost each week, before commencement of fieldwork, to assess the learning of theory.

Fall 2009, more industry examples and photographs were added to the MS PowerPoint presentations based on the summer experience the instructor had working for Houston Engineering, Inc. as a survey crew member. Especially the section on GPS and GIS, and practically every other section were enriched with many examples based on hands-on experiences the instructor had during the summer work. In every section, instructions on avoiding and managing errors were strengthened.

Fall 2010, more industry examples and photographs were added to the MS PowerPoint presentations based on the summer experience the instructor had working for ND DOT as a Site Inspector. Further fine tuning was made to instructions on avoiding and managing errors, and avoiding coordination problems in fieldwork.

Course Outcomes Assessment ACCE: (matrix content)
4.41 Basic sketching and drawing techniques
4.51 Survey, layout, and alignment control
4.52 Site organization and development
5.65 Documentation at job site and office

Communications Component:
Oral communications are very important in this course. The fieldwork sessions demand lots of coordination, which demand good communications within each group and in between groups. Although this is not specifically graded against a rubric, I point out to them in the field how communications avoid delay and enable getting the work done efficiently.

Written communications on Survey Field Books, which come under '5.65 Documentation at Job Site and Office,' is graded against a detailed matrix.

Contemporary Issues Component:
Current developments in GPS and GIS and their impact on changing surveying methods, and construction methods, e.g., use of GPS controlled bulldozer and motor grader blades, and how they change construction coordination issues are discussed.

Student Feedback:
Students often enjoyed the hands-on learning in the fieldwork classes.

A frequent complaint was that the workload was too much for a 2 credit course. It is proposed to make it a 3 credit course during a future curriculum change. That would also help in adding exercises using GPS equipment and GIS software in the future.

Students have expressed their desire to be exposed more to GPS equipment and GIS software.

There were complaints that the instructor's presentations are not clear. Developing of in-depth MS PowerPoint presentation with lots of photographs from the industry and animations has helped.

Reflection:
Biggest challenge students have in this course is the trigonometry exercises pertaining to the 'Triangulation' exercise. Students require lots of assistance as if 'holding the hand' while completing it. Also they need help in curve ranging calculations.

Students need hands-on exercises on GPS and GIS.

At present the survey maps are drawn by hand. They should really be drawn using 2D and 3D design and drafting software.

There are ethical issues in surveying. Honest reporting of survey data is important.

Proposed Actions for Course Improvement:
Special help sessions will be provided to students in the evenings, before exercises of Triangulation and Curve Ranging will commence. These sessions will be different to typical mathematics sessions offered in many contexts. The discussion will focus on how to handle a problem. A problem will be given and discussion will start on finding the first step to solve it. The discussion will continue centering on "next problem finding" and "problem analysis."

GPS equipment and GIS software will be procured, and will be used in present exercises side-by-side with conventional instruments, so that students will be able to compare, contrast and appreciate how methods, techniques and coordination issues will change.

All survey map drawing will be transitioned to be using 2D and 3D design and drafting software. Chain surveying map will be drawn in 2D, while leveling and traverse survey data will be integrated to make a 3D drawing. Creating contours, 3D surfaces, and other advanced features will be used.

An ethics component will be added to this course.