Geomatics Engineering at York University

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Growth in the geomatics industry has been increasing at a dramatic pace and it has become a multibillion dollar business that is in high need of knowledgeable and skilled geomatics engineers with multi-disciplinary expertise. In response to this high demand for geomatics professionals, two issues stand out:

a) the availability of educational opportunities in geomatics engineering, and
b) the quality, currency and adaptability of geomatics engineering education.

In 2001, York University instituted three new engineering programs, one of which was geomatics engineering. The Geomatics Engineering program at York came to fill a large void in Canada and particularly in Ontario, where there is an increased need for geomatics engineers. The plan was to provide graduates who would take the lead as developers of integrated geomatics systems and practitioners to meet the societal needs. This necessitated a full-fledged geomatics engineering program with a complete curriculum that would also satisfy the requirements of professional registration, either as a land surveyor or engineer.

The program started with 2.5 full-time-equivalent (FTE) geomatics faculty and 18 new geomatics engineering courses. Initial funding was adequate to develop the required infrastructure, purchase survey equipment, and relevant commercial software. In 2002, we built the Engineering Design Lab that hosts, among other things, 10 computers, six stable geodetic pillars and ample space to train the "infantry" on instruments and procedures and occasionally execute practical exercises when the weather does not permit outdoor activities.

Every year added its own challenge. Between 2001 and 2005, survey camps were in full swing and we mounted courses as we went along. During these years we hired one additional faculty member increasing the FTE complement to 3.5. In 2005 our first graduates went to the workforce while the program was still under development. But things were bound to pick up.

In 2006 we hired two additional faculty members, our efforts to accredit the program heated up and the establishment of the "School of Engineering" became a reality! There was a strong indication that the Canadian Engineering Accreditation Board (CEAB) would be happy with the program. In 2007, we hired one new faculty member, but we lost one… and celebrated the accreditation of the program. In 2008, we hired one more faculty that brought the total

Ben Kihara (left) and Sidra Shaheen. Monitoring deformations of Rexall Centre, York University, Keele Campus, August 2007 (Advanced Field Surveys, Photo credit: Prof. Jian-Guo Wang)

FTE to 6.5: we started breathing! The student enrolment remained critically low; our heartbeat remained high!

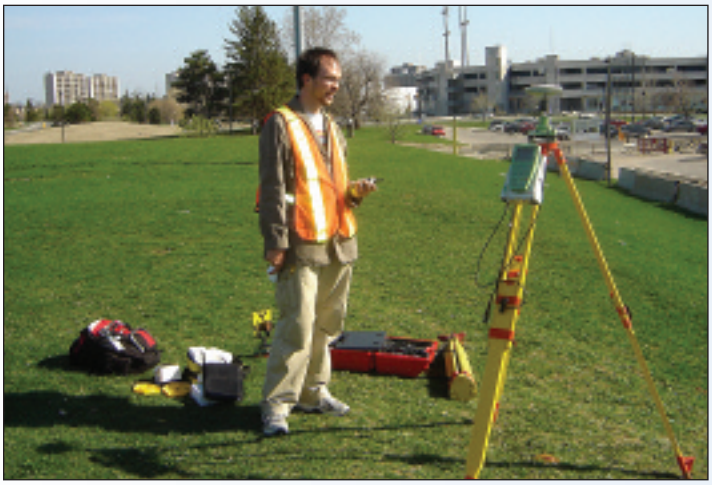
The design of the program from a blank piece of paper has its advantages: It allows dreaming, thinking, wishing and hoping, and promotes creativity, inspiration, challenge, opportunity, and invention. The program was embedded in the Department of Earth and Atmospheric Science (now Department of Earth and Space Science and Engineering) to benefit from the strong and well-established Earth Science program. The flavour of Earth science quickly permeated the new program. We seized the opportunity to build a relevant and current program commensurate with the latest technological developments and scientific advancements that arm graduates with knowledge and skills commensurate with the needs of society.

The Geomatics Engineering program at York captures the pulse of modern technology, trends and applications. The 18 new geomatics engineering courses cover a wide range of disciplines, such as geodesy, geophysics, photogrammetry, remote sensing, GIS, DTM, cadastral surveys and survey law, space science and space sensors, surveying and survey camps, adjustments and data integration, hydrography, GPS, navigation, engineering surveys, lidar systems, digital imaging and advanced 3D geospatial techniques.

The geomatics instrument lab is equipped with a variety of modern conventional survey equipment of all types and precisions and latest technology GPS receivers. A collection of nearly 15 commercial software packages cover the needs of positioning and navigation, adjustments, geoid model-

ling, photogrammetry, remote sensing, mapping GIS, lidar, and design and analysis.

At York, the geomatics engineering graduate program was developed concurrently with the undergraduate program and was integrated into the existing and well-developed Earth and Space Science graduate program. The co-existence of this well organised and vigorous graduate program provides faculty the opportunity for research, and brings in necessary funding to support graduate students. Advanced studies, innovation and breakthroughs are passed on to the undergraduate level and promote research to the public via attractive, practical and useful applications.



Goran Rauh. Establishing high precision GPS network for monitoring deformations of the Rexall Centre, York University, Keele Campus, August 2007 (Advanced Field Surveys, Photo credit: Prof. Jian-Guo Wang)

Despite our very short history, we have brought in nearly $3 million of research funding and we are currently supporting 31 graduate students (11 MSc and 20 PhD). Typical research projects comprise high precision monitoring of engineering structures, 3D city modelling and visualization, artificial intelligence for underwater habitat mapping, mineral exploration and environmental studies, remote sensing for mapping tree species and structures, and space geodetic techniques for high precision positioning, crustal deformation, post-glacial rebound studies, geoid modelling and atmospheric studies.

Professional associations, particularly the AOLS, and private industry have played and continue to play an important role in the growth, support and promotion of our program through endowments and scholarships, sharing of resources, professional meetings, fairs, and newsletters and through hiring of our students and graduates. All together we can focus on the next major effort to increase the undergraduate enrollments to make our program stronger and provide the needed geomatics engineers to the country.

For more information on the Geomatics Engineering program at York University, contact **Professor Spiros Pagiatakis** by email at: **spiros@yorku.ca.**