

INFORMATION PACKET

for the

BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS & LAND SURVEYORS

in regards to the

SURVEYING AND GEOMATICS PROGRAM OF STUDY AT CLARK COLLEGE

VANCOUVER, WASHINGTON

**Program History**

 **Background**

 The need for a Field Survey Technician program was initially identified by employers in our service district. In the spring of 2006 representatives from local engineering firms approached Clark College because they experienced difficulty filling field survey technician positions with qualified applicants. A meeting with local engineering and construction firms and governmental agencies indicated that several employers in our community had the same need. According to a survey of local employers, the lack of qualified workers was resulting in increased recruiting costs, increased workload for other employees, and lost business opportunities.

Within a year we developed and implemented the Field Survey Technician program; a one year certificate of proficiency that provided training in survey techniques and methods. The curriculum consisted of courses carefully selected in consultation with local industry to prepare a student to work in an entry-level surveying position. The intent was to create the beginning of the education process for a student to advance further in study and practice to prepare them to become licensed professional surveyors. The program resides within the Engineering transfer department at Clark College.

In 2007 we realized the need that the program needed to be a two year associate’s degree, and by the fall of 2008 the program was expanded to a second year. At the same time, the one year certificate of proficiency was suspended. Continuous improvements have been made to the program as suggested by the advisory board and to allow a smooth transition to Oregon Tech, for those students wishing to continue their education. In 2011 the program was renamed Surveying & Geomatics.

**Current Situation**

#### Degree Requirements

The Surveying and Geomatics program is designed to meet entry-level field and office skills in a variety of land surveying and geomatics occupations. Training will utilize precision electronic surveying instruments, including Global Positioning System equipment and sophisticated computerized drafting, mapping, design, and analysis software.

 The Associate in Applied Science degree is designed for students who wish to complete a program with a specific career and technical education objective. Students are required to *complete a minimum of thirty (30) credits at Clark College to meet Academic Residency* requirement. Students are required to maintain a cumulative GPA of 2.00 to receive this degree. All core and general education list requirements must be met, with any additional credits to be selected as electives. Students are encouraged to complete basic skills at the beginning of their education. The Degree & Certificate Requirements Section of the Clark College Catalog to identify the courses needed to satisfy the General Education Requirements.

 Full-time students seeking an Associate in Applied Science degree typically complete this program in a minimum of six quarters, if basic skills and prerequisites are complete. Students interested in pursuing a baccalaureate degree in a Surveying or GIS field, a formal articulation agreement between Clark College and the Oregon Institute of Technology in Klamath Falls, Oregon is in place. Please consult with an advisor for additional requirements regarding this specific educational path.

**Student Preparation**

 It is recommended that students prepare for entrance into the program by emphasizing mathematics and science in high school. Two years of algebra and one year each of geometry, trigonometry, and physics are desirable prerequisites.

**Career Opportunities**

Completion of this program prepares students for work as Surveying Technicians and can lead to a career as a Professional Land Surveyor. The employment forecast for graduates in this field are exceptional. As increasing number of licensed surveyors across the nation retire, a personnel shortage has been created within this profession.

**STEM**

Clark College offers a comprehensive array of science, technology, engineering and math (STEM) programs.

 Courses include engineering, mathematics, chemistry, geology, surveying, CADD, computer science, biology, physical sciences, and physics. As one of the largest community and technical college in Washington, Clark has demonstrated its commitment to these programs by entering into partnerships and hosting special events at the college and in the community.

There are many STEM activities, such as

* Women in STEM: [Tea](http://www.clark.edu/academics/programs/stem/documents/1347_StemT_4up_HQ.pdf), [Math Help](http://www.clark.edu/academics/programs/stem/documents/WIS_Web.pdf), Guest Speakers
* [STEM Help Centers](http://www.clark.edu/academics/programs/stem/STEMHelpCenters.php)
* [Engineering Week](http://www.eweek.org/Home.aspx)
* [Elementary Science Olympiad](http://www.clark.edu/special/scienceolympiad/elementary.php)
* [Science Olympiad](http://www.clark.edu/special/scienceolympiad/)
* [MESA (Math, Engineering, Science Achievement)](http://encs.vancouver.wsu.edu/sw-washington-mesa)

We reach out to the K-12 community through fun, hands-on, creative activities showcasing the science, math, and engineering involved. Our STEM students at Clark, primarily thought the NERD Girls (Not Even Remotely Dorky) Science club, work with K-12 to advocate for technological literacy. Our goal is to share with the K-12 community what Science Technology Engineering and Math (STEM) is and help them understand the concepts of how it relates to their everyday world. We really want to inspire students to envision their future to include STEM, and to excite their natural curiosity and creativity for a better world.

 Clark College continuously promotes STEM career exploration opportunities for its constituencies using a variety of outreach activities. We are proud to be a partner in the SEMI High Tech U initiative, which encourages high school students to pursue careers in math, science and related fields.

 The Washington State Legislature has authorized funding for a new science, math, engineering and technology building for Clark College. The building will be The Next Step in Clark's efforts to expand student access to STEM classes and programs.

**Instructional Cadre**

**Timothy Kent – PLS**

 Tim is currently the program coordinator and instructor for the Surveying & Geomatics Program at Clark College in Vancouver, where he resides. He is also the Program Director of Geomatics at Oregon Institute of Technology in Wilsonville, OR, which offers the junior and senior years of the Geomatics degree in Surveying. He teaches at Clark College full-time and coordinates the recruitment aspects for both colleges along with other duties.

 Tim retired from the BLM Oregon State Office in September of 2005 after 37 years as a land surveyor with the federal government. He graduated from Oregon Technical Institute with a bachelors degree in surveying in 1971 and joined the BLM in their Portland office. Subsequent assignments were in Eugene, Anchorage, Denver, and back to Portland in 1984. In 1990, he joined the Forest Service in Portland as the regional land surveyor for Oregon and Washington. He returned to the BLM in 2002 to finish his federal career.

 Tim is currently licensed as a land surveyor in AK, CO, WA, CA, OR and an OR-WRE and is an active member in NSPS, PLSO, and LSAW. He recently was re- elected as the Area 10 Director for NSPS and also is the PLSO Annual Conference chair. He has also been the LSAW Surveyor of the Year in 1996 and 1998 and the PLSO Surveyor of the Year in 2009. He initiated the TwiST (Teaching with Spatial Technology) program for K-12 teachers in Oregon and Washington.

 He has coordinated and instructed at numerous conferences and training sessions throughout his career, with emphasis on involving the private land surveyor in the federal surveying process. His area of expertise is in the PLSS with a special interest in historic surveying aspects.

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* **Cory Dopp – PLS**

Cory is a registered PLS in Washington and Idaho. He is currently a Survey Project Manager at MacKay Sposito, a 100+ employee Survey, Design and Consulting firm. Cory manages the surveying and mapping components of large scale projects. He has worked with MacKay Sposito since 2009. He has been surveying since 2000, working at Atkins Engineering, Zbinden Carter Engineering and Holladay Engineering.

Cory has been an adjunct instructor at Clark College since 2009, instructing Software Applications and Subdivision Planning/Platting.

Cory graduated from OIT with a Bachelor’s degree in Geomatics in June, 2004. Cory was an active member in the Professional Land Surveyors of Oregon (PLSO) Student Chapter. Cory also graduated from Treasure Valley Community College with an Associate’s degree in Computer Science in 1999.

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* **Erielle Lamb – LSIT**

In 2008, I went to California State University, Fresno to pursue my education in Geomatics Engineering. I graduated with a BS and cum laude in May 2011. I was very involved in student clubs, such as ACSM, ASPRS, CLSA, and Lambda Sigma (Geomatics Engineering Honor Society). I’ve attended many national conferences, and helped run our student conference in Fresno all three years. I also tutored many students, particularly in least squares and programming.

Currently I work for the USDA Forest Service in the Columbia Lands Zone. We are responsible for all the survey work in the Gifford Pinchot, Mt. Hood, Columbia Gorge, and Olympic National Forests. My duties include field work (traversing, GPS, brushing and boundary maintenance), writing legal descriptions, drafting and data manipulation and research. I became a permanent employee in July 2011.

I have passed the LSIT and am currently completing my responsible charge requirement. I hope to eventually run my father’s company and continue the family legacy.

I am familiar with the process of running topos, re tracing boundary lines, working with Land Desktop, visiting the Accessor’s office to find maps of properties, learning how to solve various problems, deed research, job prep, designing field plats, downloading data, and processing data.

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* **Carla Meritt – PLS**

Carla is a licensed land surveyor in Washington (2003) and Oregon (2004). She has worked in the private land surveying industry for the past 17 years. Since 2011, she has been employed by MacKay Sposito, managing a mapping group consisting of six individuals working in support of Bonneville Power Administration (BPA) mapping contract, providing oversight and guidance for the production of right-of-way acquisition documents, including legal descriptions and exhibits for fee conveyances, easements and permits necessary to construct, operate and maintain BPA transmission facilities. Prior to that, she worked as a Project Surveyor at Olson Engineering, serving also as a Project Manager and Associate Principle from 2004-2010.

Her educational background consists of a Bachelor of Arts in English from the University of Washington in 1989 and a Master’s Degree in Education, Curriculum and Instruction from Western Washington University in 1992. She began pursuing a career in Land Surveying when she started working as a draftsman at Olson Engineering in 1995 and took land surveying courses through the University of Wyoming’s distance education program between 1997 and 2002.

Carla has served on the Clark College Surveying program’s advisory committee since its conception in 2007 and as an adjunct instructor at Clark College since 2011, teaching the SURV 203 Legal Description class. She was also a member of the Oregon Institute of Technology’s Geomatics Advisory Committee from 2007-2012. She has been an active member of the Land Surveyors Association of Washington (LSAW) since 2003 and has held offices at both the state and local levels. Carla currently serves as LSAW’s state representative to the Western Federation of Professional Land Surveyors (WFPS).

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* **Brian Miyake – GISP**

University of Wyoming – BS Zoology; University of Wyoming – Remote Sensing Research Associate 1998-1999

Certified Geographic Information Systems (GIS) Professional (GISP) #00035554

i-TEN Associates, Inc. – Vice President of Operations 1999-Current

Since 1998 I have been working with geospatial data including satellite imagery, aerial photography, GIS data, survey data and CAD data. I have compiled, created and interpreted various data sets for a wide range of projects. I have been involved in the geospatial community for a variety of posts including for the American Society of Photogrammetry and Remote Sensing as a board member for seven years and on the planning committee for local and national ASPRS conferences for over 8 years. I have also been teaching GIS courses at Clark College and previously Clackamas Community College as an adjunct instructor for over 10 years.

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* **Chris Sherby – PLS**

Chris is a registered PLS in Washington, Oregon, Idaho and Utah. He is the Director of Land Surveying at MacKay Sposito, a 100+ employee Survey, Design and Consulting firm. Chris manages the day to day business and operations pertaining to the 40+ employee Survey and Mapping department. He has worked with MacKay Sposito since 1998.

Chris has been an adjunct instructor at Clark College since 2007, instructing Field Survey I, Field Survey II, Applied Math, Subdivision Planning/Platting and Software Applications. He was also an adjunct instructor at the Oregon Institute of Technology (OIT) during the 2004-2005 school year, where he instructed Field Survey II, Software Applications, Advanced Road Design and Subdivisions Planning/Platting.

Chris graduated from OIT with a degree in Geomatics in June, 2004. During his years at OIT, he worked internships with the Bureau of Land Management, California and with W&H Pacific’s Klamath Falls office. He has been continuing his education by taking classes in business, with the goal of earning an MBA. Chris was an active member in the Professional Land Surveyors of Oregon (PLSO) Student Chapter (President 2004) where he worked on a variety of volunteer projects with local Parks and Schools. Chris is a current member of PLSO and Land Surveyor’s Association of Washington.

This year (2012), Chris graduated Leadership Clark County, a one year program focusing on leadership in the community, education on the systems that keep it running, and community service.

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* **John Thomas – PLS**

John currently works for the WSDOT where he was instrumental in establishing CORS stations throughout the SW Region for the Washington State Reference Network. He is a member of the State Survey Committee where he is on the Monument Preservation Committee, proactively making engineers aware of the importance of saving monuments prior to construction. He has taught at WSDOT Survey Camps for the WSDOT since 2005. He teaches *Introduction to GPS* and *Ethics* at Clark College in the Surveying and Geomatics program.

John has always had a passion for surveying and survey education. Most recently, he has been appointed to the Advisory Board of the Survey Program at Clark Community College in Vancouver, Washington. He has been teaching the Surveying Merit Badge to young Boy Scouts in two different Troops.

John has been on the State Redefinition of Land Surveying Committee since 2006. John’s interest in the laws that affect our profession was manifested in him being appointed to Chair the Legislative Review Committee in 2002 and 2003.

John has been very active with LSAW since becoming associated with them in 1975. He has held numerous positions within the organization, culminating in his being the 2012 President.

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* **Janet Wilkins - PLS**

Janet Wilkins currently serves as a Supervisory Land Surveyor for the U S Department of the Interior, Bureau of Land Management (BLM), in the Oregon/Washington State Office. Ms. Wilkins’ responsibilities include directing the work of several “remotely located” Land Surveyors within the states of Oregon and Washington. She is responsible for the technical content of surveys submitted for approval by the BLM and serves as a technical specialist in Cadastral Survey matters.

Ms. Wilkins is licensed in the State of Oregon as a Professional Land Surveyor. Her license number is 76619PLS.

Ms. Wilkins is an adjunct faculty member for the Geomatics and Land Surveying program at Clark College in Vancouver, Washington. She also serves as the Chair for the Clark College Advisory Board, for the same program.

Ms. Wilkins has served as the Program Manager for the BLM’s Certified Federal Surveyor Program (CFedS). The CFedS program is a national training program for licensed private land surveyors.

Ms. Wilkins earned her Bachelor’s of Science degree in Geomatics from the Oregon Institute of Technology in 2005. Ms. Wilkins is currently working towards her Masters of Public Administration degree from Troy University.

Ms. Wilkins is a member, and former Vice-President of Education, for the Essayons Toastmaster Club. She is an active member of the Professional Land Surveyors of Oregon (PLSO) and the National Society of Professional Surveyors (NSPS) organizations.

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**Curriculum**

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|  | **First Year**  |
|  | **Fall Quarter** |  |
| **** | Course | # | Credits | Title |
|   | Math | 103 | 5 | Trigonometry (F W Sp Su) |
|   | Social Science | xxx | 3 |  (see approved list) |
|   | Engr  | 113 | 2 | Sketching & Visualization (F W Sp) |
|   | Surv  | 100 | 2 | Introduction to GPS (F) |
|   | Surv  | 121 | 5 | Field Survey I (F) |
|  |  |  | 17 |  |
|  |  |  |  |  |
|  | **Winter Quarter** |  |
| **** | Course | # | Credits | Title |
|   | Math  | 111 | 5 | College Algebra (F W Sp Su) |
|   | Surv | 122 | 5 | Field Survey II (W) |
|   | Surv | 123 | 2 | Survey Tech Seminar (W) |
|  | Hum | xxx | 3 | (see approved list) |
|  |   |   | 15 |   |
|  |   |   |   |   |
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|  | **Spring Quarter** |  |
| **** | Course | # | Credits | Title |
|   | Surv | 104 | 5 | Computation & Platting (Sp) |
|   | Surv | 163 | 5 | Route Surveying (Sp) |
|  | Engl& | 135 | 5 | Technical Writing (F W Sp) |
|   | HPE | 220 | 3 | Industrial Health & Fitness |
|  |   |   | 18 |   |
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|  | **Second Year**  |  |
|  | **Fall Quarter** |  |  |
| **** | Course | # | Credits | Title |  |
|   | Math& | 151 | 5 | Calculus I (F W Sp Su) |  |
|   | CADD | 140 | 4 | Basic AutoCAD (F W Sp Su) |  |
|   | Surv | 125 | 3 | Introduction to GIS (F) |  |
|   | Surv | 202 | 4 | Boundary Surveying (F) |  |
|  |  |  | 16 |  |  |
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|  |  |  |  |  |  |
|  | **Winter Quarter** |  |  |
| **** | Course | # | Credits | Title |  |
|   | Surv | 223 | 3 | Boundary Law I (W) |  |
|   | Surv | 250 | 3 | ArcGIS I (W) |  |
|   | Phsc | 101\* | 5 | General Physical Science (F W Sp) |  |
|   | Cmst& | 210 | 5 | Interpersonal Communication (F W Sp Su) |
|  |  |  | 16 |  |  |
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|  |  |  |  |   |  |
|  | **Spring Quarter** |  |  |
| **** | Course | # | Credits | Title |  |
|   | CADD | 143 | 4 | Civil Drafting with AutoCAD (Sp) |  |
|   | Surv | 264 | 3 | Survey Software Applications (Sp) |  |
|   | Surv | 203 | 3 | Legal Descriptions (Sp) |  |
|   | Surv | 225 | 3 | Subdivision Planning & Platting (Sp) |  |
|   | Btec | 169 | 3 | Introduction to Excel (F W Sp) |  |
|   |  |  | 16 |  |  |
|  |  |  |  |  |  |
|  | **Total Credits** |  | **98** | **Associate in Applied Science** |  |
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|  |  | \* 104, 110 are also acceptable |  |

**Course Descriptions**

**INTRODUCTION TO GPS**

SURV 100

 **2 Credits**

11 hours of lecture - 22 hours of lab

Introduction to global positioning tools. Fundamental concepts and use of modem handheld GPS. Includes field work and use of basic GPS software. Prerequisite: A grade of "C" or better in MATH 095 or qualifying score on placement test.

**FUNDAMENTALS OF SURVEY**

SURV 102

**2 Credits**

11 hours of lecture - 22 hours of lab

Introduction to concepts of map reading, coordinate systems, the Public Land Survey System, basic legal descriptions of real property, plotting field data and creating a plat, and the minimum requirements for preparing plats in the State of Washington. No field work required.

**APPLIED MATH FOR SURVEYING**

SURV 104

**5 Credits**

55 hours of lecture

Basic coordinate geometry, curves and solutions, conversions, statistics and error analysis, traverse calculations, inversing, coordinate positions, and area calculations. Prerequisite: A grade of "C" or better in MATH 103.

**FIELD SURVEY I**

SURV 121

**5 Credits**

88 hours of lecture - 44 hours of lab

Basic theory of surveying, measurement and calculation. Topics include measurement and determination of boundaries, areas, shapes, and location through traversing techniques, error theory, compass adjustments, public land system, and use of programmable calculators. Also covers principles of measurements of distances, elevation and angles. Concurrent enrollment in Lab. Prerequisite: A grade of "C" or better in MATH 095 or qualifying score on placement exam.

**FIELD SURVEY II**

SURV 122

**5 Credits**

33 hours of lecture - 44 hours of lab

Theories of electronic distance measurement, instrument calibration and analysis; principles of route location and design; theories of circular, parabolic, and spiral curves; highway and railway geometric design; area and volumes of earthwork; and mass diagrams. Prerequisite: A grade of "C" or better in SURV 121.

**SURVEY TECHNOLOGY SEMINAR**

SURV 123

**2 Credits**

22 hours of lecture

Survey safety, ethics, and communication. Problem solving methods, procedures, and human relations related to on-the-job work experience in field surveying. Prerequisite: Completion of, or concurrent enrollment in, SURV 121.

**INTRODUCTION TO GIS**

SURV 125

**3 Credits**

33 hours of lecture

Introduction to Geographic Information Systems (GIS) methods and theory. Background and development of GIS technology. Introduction to relational and spatial databases and spatial analysis. Prerequisite: A grade of "C" or better in MATH 089 or 090, or placement in MATH 091 or higher.

**ROUTE SURVEYING**

SURV 163

**5 Credits**

33 hours of lecture - 44 hours of lab

Introduction to elements of horizontal and vertical route alignment and layout. Use design software and a total station for the construction of a section of road. Include the construction of a topographic map, a centerline alignment, and a final plan and profile showing centerline alignment. Use of topographic data for earthwork computations for proposed route. Prerequisite: A grade of "C" or better in SURV 162.

**CO-OP WORK EXPERIENCE**

SURV 199

**1 - 5 Credits**

165 hours of clinical

Work-based learning experience that enables students to apply specialized occupational theory, skills and concepts. Specific objectives are developed by the College and the employer. Prerequisite: A grade of "C" or better in SURV 121.

**BOUNDARY SURVEYS**

SURV 202

**4 Credits**

44 hours of lecture

Principles and laws relating to boundary surveys, including their creation, ownership, and the role of the surveyor; introduction to the Public Land Survey System, including history, proportioning, subdividing and evidence analysis. Topics include boundary history and boundary surveys, rights in land, junior/senior title rights, retracement of originals surveys, deed first/survey first, common and case law, ranking/prioritizing evidence, controlling monuments and corners, errors in legal descriptions and plats. Prerequisite: A grade of "C" or better in SURV 121.

**LEGAL DESCRIPTIONS**

SURV 203

**3 Credits**

33 hours of lecture

Research and practice pertaining to the legal aspects of writing land description documents used in real property; written research project required. Prerequisite: A grade of "C" or better in SURV 121.

**BOUNDARY LAW I**

SURV 223

**3 Credits**

33 hours of lecture

Introduction to statute law, common law, case law, and legal principles of land boundaries and the practice of land surveying in Washington. Topics include an introduction to principles of professional practice and ethical consideration. Prerequisite: A grade of "C" or better in SURV 121.

**SUBDIVISION PLANNING A & PLATTING**

SURV 225

**3 Credits**

33 hours of lecture

A study of selected state laws and regulations pertaining to the surveying profession that affect the surveying of division of lands; layout and design of subdivisions; environmental considerations and site analysis procedures. Prerequisite: A grade of "C" or better in SURV 102 and 122.

**ARC GIS I**

SURV 250

**4 Credits**

22 hours of lecture - 44 hours of lab

Introduction to ArcGIS. GIS concepts, methodologies, and techniques. Prerequisite: A grade of "C" or better in SURV 125.

**SURVEY SOFTWARE APPLICATIONS**

SURV 264

**3 Credits**

22 hours of lecture - 22 hours of lab

Use of surveying and related software to solve and plot assignments in traverse calculations, horizontal and vertical curve alignments, profiles, contours, and earthwork calculations. Some hand generated plots and calculations will be made to supplement the computer calculations. Prerequisite: A grade of "C" or better in SURV 121.

**SELECTED TOPICS**

SURV 280

**1 - 6 Credits**

44 hours of lecture

Course focuses on selected topics in Surveying. Topics vary, and course theme and content change to reflect new topics. Because the course varies in content, it is repeatable for credit for different topics. [SE]

**SPECIAL PROJECTS**

SURV 290

**1 - 5 Credits**

Opportunity to plan, organize, and complete special projects approved by the department. Prerequisite: Consent of Instructional Unit. [GE]

**Graduation Statistics**

The structure and newness of the surveying program makes it difficult to ascertain the exact number of graduates to date. There are a number who have completed the Field Survey Technician program, some taking three to four years to complete. The last known student in this program was in a course during winter term 2012. It is estimated that ten students completed this certificate program.

In 2008 when the Associate of Applied Science program was initiated, there were about six to eight students beginning the program. It took another three years of program adjustments to fully implement the current course offerings. This has resulted in approximately eight graduates to date, with two of those transferring to OIT in Klamath Falls for the continuation of their academic career. Both of these transferees have since graduated with their bachelor degrees.

The current academic year has twelve new students registered for the program along with approximately ten to fifteen students in varying stages of their course studies. The entire surveying and geomatics program is offered in the evenings and weekends, making it very attractive to those wishing to initiate a career change.