Geospatial technologies enhancing Surveying education through project based learning

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About our graduates

• Bachelor of Engineering (Surveying)

• 30 – 40% of our graduates will become Registered Surveyors in NSW

• Career is a blend of indoor/outdoor work, applying theory to real field projects

• Early career in the field, later in management and business development

• Lots of new devices and geospatial technology, fundamentals are the same
GMAT4150 – Field Projects 2

- Final year capstone course

- No lectures, no exams, weekly meetings in lab with expert supervision and extended field exercises

- Course coordinator acts as client and prepares project briefs

- Student cohort organises themselves. Appoint managing director and coordinate tasks. Combine with expertise, thesis projects and desire to learn new things

- Focus is on the quality of education and completing challenging tasks

- Previous projects Chifley Dam, Manly, Sofala, Berry, Lake Conjola
Location - Helensburgh
Context

• Class sizes are small

• School of SAGE recently merged

• CVEN has more funding which has enabled purchase of new equipment (GNSS, robotic TS, laser scanner, UAVs)

• Looking to use new devices for senior student exercises. Locations for flying UAVs limited in city

• Challenges with academics knowing how to teach use of new gear

• Some tasks unknown if outcome is possible
Task 1 - Laser scan of weighbridge building

- Laser scan the weighbridge building and georeference on the Australian national coordinate system (MGA) and height system (AHD)
- Use any surveying technique and demonstrate the precision and accuracy of the technique
- Produce a client deliverable using laser scan software.
- **Extension:** Determine a method to import the laser scanned model into the UAS 3D model in software.
- **Optional:** Print out model of weighbridge on a 3D printer on-campus.
Task 1 - Laser scan of weighbridge building
Task 2 – 3D UAS site map

- Produce a georeferenced 3D model of the whole site using 2 different UAV platforms (resolution 2-3cm).
- Design location and density of proposed ground control points (GCPs) for UAS survey using Leica Viva GNSS to confirm quality of marks.
- Flight planning (coverage, image overlap and ground sampling distance) with consideration of size of terrain and resolution of final product.
Task 2 – 3D UAV site map
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Some innovation on the side

- Former thesis students from Mech Eng and Elec Eng have created a start up company.
- Designed and built GPS tiles and wanted to test.
- GMAT4150 students combined with their project.

AeroPoints are the World’s first smart ground control points, with:

- Wireless connectivity to upload position information instantly
- Survey grade accuracy from in-built PPK for precision coordinates
- One button position logging - Propeller servers get position information in seconds with the touch of a button
- Ultimate durability - solar powered, waterproof and weather resistant
Task 3 – Cadastral model of Helensburgh Waste Facility

- Prepare a cadastral model of the Helensburgh waste facility.
- Searching historical cadastral plans of the site.
- Interpret and input into a cadastral model using the Geodata software. Ian Harper from Geodata to assist.
- Use model in the field to try to find original cadastral marks in the field.
Task 3 – Cadastral model of Helensburgh Waste Facility
Communication and Feedback

- Weekly meetings in student lab
- Students were asked how they will communicate as a group. They elected to use Facebook and prepare reports using Google docs. The “client” was added to both forms of communication
- Week 7 individual face-to-face interviews with students for feedback
- Supervisor available for Friday meetings to answer questions
- In week 9 the client was O/S and arranged for an industry partner to take the class. The local industry partner could not attend so students attempted to run class using Skype from alternative industry partner in New Zealand.
Self assessment

• Students “costed” the job based on hours
• Course coordinator developed quantitative assessment based on hours, leadership, innovation, effort, punctuality.
• A major part of the assessment was through self-assessment
• This was carefully explained to students as not an abrogation of responsibility on behalf of the course coordinator, but rather an opportunity for students to act as professionals and provide honest, critical assessment of their own performance and that of the group and nominate a mark for themselves.
• Results were very pleasing and surprisingly close to the quantitative assessment
Conclusion

This course tried to use the latest gear purchased in the school for some “real-world” survey tasks

Focus was on management and completion of survey tasks. Also communicating the professional nature of the group work back to students.

Group work, individual assessment

Focus of this course is very much on quality and enabled by smaller class sizes

Very enjoyable to teach but requires careful supervision and lots of communication with the student cohort to adapt as circumstances change
Questions?