

## Industry Input Contributes to Geology Curriculum Review

Francis H M Jones PEng



The diversity of career options in the geoscience professions has increased dramatically since the days when geology and civil engineering were the principle academic disciplines available to students. Have the degree options offered at universities in British Columbia kept up with corresponding changing needs of the geoscience industries?

The University of British Columbia's (UBC) Department of Earth and Ocean Sciences (EOS) recently considered this question as part of UBC's Carl Wieman Science Education Initiative<sup>1</sup> (CWSEI), which aims to improve the delivery of undergraduate science education. One aspect of the initiative involves review of curricula, including asking whether degree programs are aligned with the needs of the professions.

To address this issue, hiring practices and needs were investigated by interviewing 64 individuals representing 49 different companies at the Mineral Exploration Roundup tradeshow held in Vancouver in January 2010. Industry sectors represented include mineral exploration and mining, geochemistry labs, engineering, environmental, geophysics, and others (drilling, satellite imaging, etc). All interviewees were asked the same set of questions about themselves, their companies, hiring practices and, most importantly, desirable skills, knowledge and attributes of new hires.

Career options at the time were clearly diverse because companies claimed to be hiring into 15 specific professions. The top four were geological engineering, geology, environmental science and geophysics.

Based on interview results, three consistent themes emerged regarding industry needs and hiring preferences. The results were not surprising; however, they do represent a set of consistent messages coming from diverse individuals in a wide range of companies.

First, most interviewees preferred seeing a recent graduate with a degree that was clearly defined, rather than a loosely specified earth science degree. The national and provincial context for this message from industry is interesting. A database of university programs in Canada at the Association of Universities and Colleges of Canada<sup>2</sup> (AUCC) reveals that nationally, 13 institutions offer degrees with “geology” in the title, but none are in BC. Twenty-two institutions offer “Earth Science” degrees or similar, four of them in BC.

Students also seem to want a “geology”-focused degree option. Demand has been consistent since 1999, with  $32 \pm 8$  students graduating each year from EOS with a general majors or geology honors degree. Also, a recent poll of undergraduate earth science students at UBC indicated that overwhelmingly they would prefer a “geology” degree rather than an “earth and ocean sciences” degree.

This preference of industry and students is complemented by changes under way at UBC. In particular, a BSc Major in Geology degree is being implemented for September 2012, with course content and sequencing being informed by current APEGBC recommendations. Also, many geoscience courses are being upgraded as part of the CWSEI. This is resulting in curricula and teaching practices that are significantly more student-centric, and based on clearly articulated knowledge, skills and attitudinal learning goals, many of which are consistent with what we learned by interviewing industry representatives about preferred qualifications or experiences.

These desirable characteristics constitute the second theme emerging from interviews. Many employers indicated a need for focused employees with discipline-specific experience and training. It was surprising, however, that few participants in the survey explicitly identified the benefits of breadth in education that a major research university can provide.

Interviewees recognized that fundamental technical knowledge is adequately addressed by most degrees. In addition, 20 generic skills were identified, with the top six, in order of preference, being field work, computer literacy, an application (not theoretical) orientation, writing, communications, and team work. Additional experiences considered most attractive to employers included work-related or co-op jobs and exchange programs. Research experience and an official minor component to a degree were considered less important.

The third theme was a recurring set of desirable non-academic attributes or attitudes. These include interest in and enthusiasm for doing field work; cooperative and self-directed attitudes about work; realistic expectations for advancement; and an understanding of how companies and industry work.

The consistency of this third message has helped confirm the importance of incorporating desirable non-academic attributes into specifications of degree program outcomes. As UBC’s renewed BSc Majors in Geology is refined, these attributes are being incorporated into newly articulated program learning outcomes with the expectation that instructors will incorporate opportunities to practice these skills into their courses. In this way, instructors, students and industry will be better able to identify where students practice each desirable technical, professional, and attitudinal skill.

Speaking to industry representatives to compare hiring practices and needs across many companies involved in BC’s geoscience sector has been informative. These kinds of data should help ensure that BC’s degree granting institutions continue to respond to the needs of the professions as they develop and administer degree programs that produce geoscience professionals who are in high demand provincially, nationally, and internationally. The complete report from this study can be found online at <https://circle.ubc.ca/handle/2429/37246>. ☒

*Francis Jones PEng MSc is Acting Director of the Science Education Initiative in UBC’s Department of Earth and Ocean Sciences, where his work involves implementing persistent evidence-based improvements to teaching practices and courses.*

<sup>1</sup> [www.cwsei.ubc.ca/](http://www.cwsei.ubc.ca/) and [www.eos.ubc.ca/research/cwsei/](http://www.eos.ubc.ca/research/cwsei/)

<sup>2</sup> [oraweb.aucc.ca/showdcu.html](http://oraweb.aucc.ca/showdcu.html) (February 8, 2012).