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Article abstract

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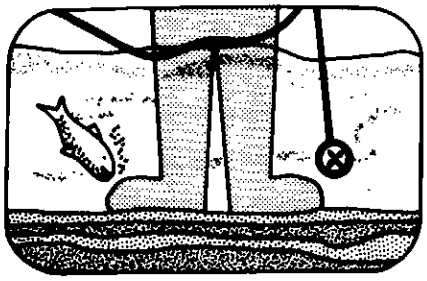

Geological Education

Undergraduate Courses in Sedimentary Geology at Canadian Anglophone Universities

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Summary
Most courses in Canadian universities are single term or semester courses. The most common offerings are: (i) at the elementary level, sedimentary petrography taught as part of a general course in igneous, sedimentary and metamorphic petrography, and a course in "Sedimentation and Stratigraphy"; (ii) at the more advanced level, Petroleum Geology (or Fossil Fuels), Stratigraphy, and Sedimentology. Many departments offer a variety of more specialized courses, and few offer a general year-long course in the physical and chemical principles of Sedimentology.

Introduction
In December, 1985, I conducted a survey of courses in "sedimentary geology" taught in English in Canadian universities. My purpose in doing this was to help me in making a personal decision: whether or not to embark on a third edition of a textbook on sedimentary rocks. I produced a compilation of course offerings, based on 1985-1986 calendars, and sent this with some comments and a questionnaire to sedimentology instructors in 27 universities. I received a very high proportion of responses. Table 1 is the compilation, corrected in the light of responses I received. Such a compilation has, of course, many limitations. It is impossible to categorize adequately all the possible ways in which sedimentary geology is taught, even by using 10 categories. Many respondents pointed out to me that their departments were on the point of introducing curriculum revisions. Others suggested that the titles and even the descriptions of courses appearing in their calendars gave a poor indication of the real course content. But from the survey, including also the extensive comments on their curriculum which many respondents volunteered, it seems that it is possible to draw some general conclusions about the way that sedimentary geology is taught in (anglophone) Canadian universities.

Before offering these comments, however, a few words in explanation of Table 1. "Sedimentary Geology" is considered to cover sedimentology, stratigraphy, sedimentary petrology, facies, and fossil fuels, but *not* paleontology. Geochemistry was included only where specific courses in sedimentary geochemistry were offered. These decisions were arbitrary ones, designed to limit the scope of the survey.

General Findings of the Survey
(1) Most universities now offer mainly one term or one semester courses in sedimentary geology, rather than courses which extend over a full year. This is probably quite general, applying to many other fields of study, and may even be actively encouraged by many deans for reasons of administrative convenience. It is a practice which does not seem to have been recognized widely by textbook writers and publishers, who continue to offer texts more than 500 pages in length, costing more than $60. Most instructors, however, are not really seeking long, comprehensive texts (which might cover material taught in several semesters) though they agree that these are frequently useful as reference books. Students certainly do not wish to be required each year to purchase 10 books, totalling more than 5000 pages and costing more than $500 in aggregate.

(2) At the second or third year level, most departments teach: (i) sedimentary petrography, generally (14/27) as part of combined igneous-sedimentary-metamorphic petrography course; and (ii) a single semester of "Sedimentation and Stratigraphy", which generally seems to be facies-oriented. The persistence of many two-semester integrated courses in petrography seems to be a consequence of the strong emphasis on the study of rocks using the petrographic microscope which is still retained at most Canadian universities.

(3) At a more advanced, third or fourth year level, the most commonly offered courses are: (i) Petroleum Geology, or Fossil Fuels (18/27), (ii) Stratigraphy (15/27), and (iii) Sedimentology (13/27). Stratigraphy seems to be taught in a variety of ways: as principles, as regional geology, or as study of a particular era (or eras). The most common approach to Sedimentology is the facies approach, with minor treatment of chemical and physical principles. (4) A considerable variety of specialized courses ("Facies Models", "Basin Analysis", "Carbonate Petrology", "Clastics", etc.) are offered at the senior undergraduate level.

Comment
The following are offered as some personal "Pyroclast-style" comments on the main findings of this survey.

(1) The large textbook is on its way out — even though one 600-page book is generally much cheaper than two 300-page books.

(2) Few departments offer a planned, coordinated curriculum in sedimentary geology at the senior level: course offerings at this level tend to be determined, like graduate courses, by the research interests of the faculty. This is probably also true of other fields in geology.

(3) The popular way to teach sedimentary geology is largely descriptive, through study of sedimentary rocks in thin section, and through a description of sedimentary environments and their associated facies. Little attention is devoted to the teaching of the physical and chemical principles of sedimentary rock genesis. No university in Canada, for example, appears to teach an undergraduate course for which the new text by J.R.L. Allen (*Principles of Physical Sedimentology*, published by Allen and Unwin, 1985) might be adopted as the primary text.

(4) In 1981, Harvey Blatt published an editorial in the *Journal of Sedimentary Petrology* (v. 51, p. 355-357) in which he deplored the inadequate preparation in supporting science and math demanded of doctoral candidates in sedimentology. My survey seems to indicate that most of those teaching sedimentary geology also think that an understanding of chemical and physical principles of sedimentology is unnecessary for the undergraduate geologist, or at least an impractical ideal, and subordinate in importance to a general descriptive knowledge of sedimentary environments. If this is true, then like Harvey, I find that "the result is a disaster for the student". Of course, Harvey may have exaggerated a little: the greatest "disaster for the student" is probably an instructor who does not arouse the student's interest in the subject, and there is no denying the enthusiasm of those who teach the environmental approach to sedimentology. But an emphasis on description and deductive models can be a very dangerous approach to a subject, as witness the history of geomorphology in the early part of this century. The Davisian approach to landscape was at first highly successful and popular, but led to a period of disciplinary stagnation. Geomorphology has recovered and achieved a new vigour by a renewed emphasis on process: in fact, it is ironic that many geography courses now provide a more rigorous training in the physical processes of erosion, transportation and deposition of sediment than do the corresponding courses in geology departments. Let us hope that the present trend to neglect physical processes in the teaching of sedimentology does not have equally debilitating consequences.

Table 1

Column ⇒ / University ⇓	1 Petrol.	2 Sed. Pet.	3 Sed.& Strat.	4 Sed.	5 Strat.	6 Fac. /Env.	7 Clas. /Carb.	8 Fuels	9 Coal	10 Geo-chem.
Acadia	x	—	—	3	3	—	—	4	—	—
Alberta	x	—	2,3	—	—	4	—	4(3)	—	—
Brandon	x	3	—	3	4	3	—	4	—	—
U.B.C.	x	—	2	2,4	—	—	4L	4	4	—
Brock	—	—	3	—	—	—	2S,3L	—	—	4
Calgary	—	3	2	—	4	4	—	4	—	3
Carlton	—	—	—	4	2,3	—	—	4	4	—
Concordia	x	4	—	—	3	—	—	4	—	—
Dalhousie	—	—	2	4	3	3	—	—	—	—
Guelph	x	—	—	—	2	—	4L,4S	3	—	—
Lakehead	—	2	—	—	4	3	—	2 or 4	—	—
Laurentian	—	—	—	3	4(2)	—	—	—	—	—
Lethbridge	x	4	3(2)	—	—	—	—	4	—	—
Manitoba	x	4	3(2)	—	—	—	—	4	—	—
McGill	x	—	3(2)	—	—	—	—	3	—	—
McMaster	x	—	—	4(2)	—	—	—	—	—	—
Memorial	x	—	—	3	2,4	4	—	4	—	—
U.N.B.	—	—	2	3,4	—	—	4L(2)	—	—	3
Ottawa	—	3	2	4(2)	—	—	—	—	—	4
Queen's	x	3	2	—	4	—	4L,4S	—	—	—
Regina	—	3	—	4	3	—	4L	4	—	—
St. F-X	—	—	2	—	—	—	—	4(2)	4	4(2)
St. Mary's	—	2	2	3,4	—	—	—	3	—	—
Saskatoon	—	—	2,3(4)	—	—	—	—	—	—	—
Toronto	x	—	2	—	3	—	4S	4(2)	—	—
Waterloo	x	—	—	3,4	2,4	—	—	—	—	—
Western	—	3	—	—	2,4	—	4L	4	—	4

NOTES:

x indicates the course is offered (year not specified)

3(2) indicates the course is given in 2 terms in the third year

2,4 indicates the course is given for one term in the second year + one term in the fourth

Column 1: Introductory Course in Igneous, Sedimentary and Metamorphic Petrology
Column 2: Separate Sedimentary Petrography Course
Column 3: Sedimentation and Stratigraphy
Column 4: Sedimentology
Column 5: Stratigraphy (may include also some sedimentology and paleontology)
Column 6: Facies or Environments
Column 7: Clastics (S) or Carbonates (L)
Column 8: Petroleum Geology or Fuels
Column 9: Coal
Column 10: Sedimentary Geochemistry (separate from other geochemistry courses)

U.B.C., Lethbridge and Manitoba also offer level 4 courses in Basin Analysis.

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