

SIMON FRASER UNIVERSITY

S.81-129

MEMORANDUM

To Members of Senate

From Office of the Dean of Graduate Studies

Subject Graduate Curriculum Changes -
New Graduate Course Proposals, MRM
661-5, 662-5, 633-5

Date September 15, 1981

MOTION: That Senate approve and recommend approval to the Board, as set forth in *S.81-129* - New Graduate Course Proposals, MRM 661-5, 662-5 and 633-5.

These new graduate course proposals were approved by the Executive Committee, Senate Graduate Studies Committee, at their meeting on August 31, 1981.

Bryan P. Beirne
Dean of Graduate Studies

mm/
attachs.

SIMON FRASER UNIVERSITY

New Graduate Course Proposal Form

CALENDAR INFORMATION:

Department: Natural Resources Management Program Course Number: MRM 661
Title: Special Topics in Resources Management
Description: Special topics in areas not currently offered within the offerings
of the MRM Program.
Credit Hours: 5 Vector: 5-0-0 Prerequisite(s) if any: _____

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: ? When will the course first be offered: ?
How often will the course be offered: when a new course number is need

JUSTIFICATION:

There has been considerable experimentation with new courses which
are tried once or twice before deciding if a permanent course should
be proposed.

RESOURCES:

Which Faculty member will normally teach the course: unknown
What are the budgetary implications of mounting the course: Such a course would
initially be taught by sessional instructors
Are there sufficient library resources (append details): ?

- Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: J. C. Day Date: 2 July 1981
Faculty Graduate Studies Committee: P. J. Brantingham Date: 2 July 1981
Faculty: P. J. Brantingham Date: 7 July 1981
Senate Graduate Studies Committee: B. M. Blum Date: 21 Feb 81
Senate: _____ Date: _____

SIMON FRASER UNIVERSITY

New Graduate Course Proposal Form

CALENDAR INFORMATION:

Department: Natural Resources Management Program Course Number: MRM 662

Title: Special Topics in Resources Management

Description: Special topics in areas not currently offered within the offerings of the MRM Program.

Credit Hours: 5 Vector: 5-0-0 Prerequisite(s) if any:

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: ? When will the course first be offered: ?

How often will the course be offered: when a new course number is needed

JUSTIFICATION:

There has been considerable experimentation with new courses which are tried once or twice before deciding if a permanent course should be proposed.

RESOURCES:

Which Faculty member will normally teach the course: unknown

What are the budgetary implications of mounting the course: Such a course would initially be taught by sessional instructors.

Are there sufficient Library resources (append details): ?

- Appended: a) Outline of the Course b) An indication of the competence of the Faculty member to give the course. c) Library resources

Approved: Departmental Graduate Studies Committee: J. C. Day Date: 2 July 1981
Faculty Graduate Studies Committee: P. J. Brantley Date: 7 July 1981
Faculty: P. J. Brantley Date: 7 July 1981
Senate Graduate Studies Committee: P. J. Brantley Date: 20 Sept 81
Senate: Date:

RECEIVED
JUN 8 - 1981

SIMON FRASER UNIVERSITY
New Graduate Course Proposal Form

CALENDAR INFORMATION:

Department: Master of Natural Resources Management Course Number: MRM 633-5
Title: Introduction to Remote Sensing and Aerial Photographic Interpretation
Description: SEE ATTACHED SHEET

Credit Hours: 5 Vector: 2-0-3 Prerequisite(s) if any: none

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 10-20 When will the course first be offered: 82-1
How often will the course be offered: once annually

JUSTIFICATION:

Remote sensing is a standard methodology used to collect and analyze physical, biological, and social information rapidly and at low cost. These are essential skills for resource managers. Increasingly, computer mapping is used in conjunction for data analysis and display.

RESOURCES:

Which Faculty member will normally teach the course: Arthur Roberts

What are the budgetary implications of mounting the course: For the first year the Department of Geography and the Natural Resources Management Program are requesting approximately \$15,000 to establish a basic remote sensing laboratory. Eventually, more sophisticated equipment will be needed to permit advanced analysis.

Are there sufficient Library resources (append details): _____

- Appended:
- a) Outline of the Course
 - b) An indication of the competence of the Faculty member to give the course.
 - c) Library resources

Approved: Departmental Graduate Studies Committee: J.C. Day Date: 4 June 1981
Faculty Graduate Studies Committee: P.J. Beaulieu Date: 8 June 1981
Faculty: P.J. Beaulieu Date: 8 June 1981
Senate Graduate Studies Committee: Paul Beece Date: 21 Jun 81
Senate: _____ Date: _____

DESCRIPTION:

Introduction to remote sensing and aerial photographic interpretation. The application of these techniques in the acquisition and display of selected resource data. Topics include air photo interpretation, multiband photography, thermal infrared imagery, satellite imagery, orthophotography, topographic and thematic mapping, and computer cartography.

1 June 1981

APPENDIX A

Course Outline

The first half of the course covers remote sensing principles, instrumentation, and analysis. The second half deals with remote sensing applications in resource management and will involve student presentations. A seminar format will be used with lectures and discussions on outlined topics. Readings will be assigned in advance of the topics and applications will be oriented towards specific resource interests of the students. Six practical laboratory assignments are included to familiarize the students with important basic aspects of applied remote sensing.

TOPICS

I. Principles, Instrumentation and Analysis

a. Introduction to Remote Sensing:

- principles, concepts, and philosophical problems
- scope and importance
- electromagnetic spectrum and atmospheric effects

b. Aerial Photographic Interpretation:

- properties of panchromatic aerial photography
- principles and procedures for interpretation
- photo mosaics

LABORATORY 1: Introduction to aerial photography: - characteristics of the stereo model; drainage interpretation.

c. Visible Spectrum and Photographic Techniques:

- image acquisition, flight planning and equipment
- optical and electronic image analysis

d. Nonphotographic Optical Sensors:

- measurement and design considerations
- radiometers, thermal scanners, and multispectral scanners

LABORATORY 2: Planning of aerial photography missions: - Interpretational and logistical requirements.

e. Passive and Active Microwave Systems:

- theory and applications
- Imaging radars
 - side looking airborne radar
 - synthetic aperture radar
 - multi-channel radar

- f. Airborne Geophysical Systems:
- aerial magnetometer surveys
 - inductive field electromagnetic surveys
 - gamma ray spectrometry
 - air sampling and miscellaneous techniques

LABORATORY 3: Interpretation of thermal imagery: - contaminant dispersion and water resource management.

- g. Satellites and Sensors:
- Landsat
 - Skylab
 - Seasat
 - Space Shuttle
 - Meteorological satellites

- h. Data Analysis and Ground Truth:
- air photo interpretation and terrain analysis
 - computer processing pattern recognition
 spectral analysis
 quantitative feature extraction
 - comparison of qualitative and quantitative techniques
 - ground truth for remote sensing

LABORATORY 4: Terrain analysis: air photo interpretation and highway route planning.

II. Remote Sensing Applications and Resource Management

- I. Remote Sensing in Agriculture and Forestry:
- radiation and plant canopies
 - vegetation stress from disease, insects, and environment
 - crop identification
 - forest resource management

j. Geological Applications:

- photo-geology
- radar imagery
- multi-spectral techniques

LABORATORY 5: Basic photogrammetry: - height measurement and timber volume calculations.

k. Hydrological Resource Management:

- information requirements and hydrological parameters
- contaminant dispersion
- ground water, sediments and snow melt

l. Oceanography and Remote Sensing

- physical, biological, geological, chemical, and political considerations
- maritime weather and navigation
- hydrographic and coastal applications
- sea ice
- fisheries and political considerations

LABORATORY 6: Interpretation of colour photography: - water penetration film and vegetation stress.

m. Terrain Analysis and Cultural Applications:

- mapping
 - scale and resolution
 - thematic mapping
 - orthophotos
 - computer cartography
- geographical research
 - photogrammetry
 - temporal considerations
 - urban applications
 - rural applications
 - developing countries

APPENDIX C

Library Resources

- Aird, W.J. and S.P. Pierce. 1976. Remote Sensing Data Summary. Ottawa, Ont.: Environmental Conservation Directorate, Environmental Protection Service, Environment Canada, 5v.
- Canada. Energy, Mines, and Resources. 1978. Canadian Advisory Committee Reports on Remote Sensing. Ottawa, Ont.: Queen's Printer.
- Canadian Journal of Remote Sensing, Ottawa, Canadian Aeronautics and Space Institute, 1975-present.
- Cihlar, J. 1978. CCRS Airborne Program Assessment: 2v. Analysis and User Reports. Ottawa, Ont.: Energy, Mines, and Resources.
- Glen, J.W., R.J. Adie and D.M. Johnson eds. 1975. "Symposium on remote sensing in glaciology", Journal of Glaciology, Vol. 15, No. 73:1-482.
- IEEE Transactions on Geoscience and Remote Sensing. New York, N.Y.: Institute of Electrical and Electronic Engineers.
- Kogan, R.M., I.M. Nazarov and S.D. Fridman. 1971. Gamma Spectrometry of Natural Environments and Formations: Theory of the Method Applications to Geology and Geophysics. Springfield, Ill.: U.S. Department of Commerce, National Technical Information Service.
- Lillesand, T.M. and R.W. Kiefer. 1979. Remote Sensing and Image Interpretation. Toronto, Ont.: John Wiley and Sons.
- Lintz, J. and D.S. Simonett. 1976. Remote Sensing of Environment. Don Mills, Ont.: Addison-Wesley.
- Leuder, D.R. 1959. Aerial Photographic Interpretation: Principles and Application. New York, N.Y.: McGraw-Hill.
- Meier, M.R. 1979. "Remote sensing of snow and ice", Technical Papers in Hydrology, NO. 19, UNESCO.
- Photogrammetria. Amsterdam: Elsevier.
- Photogrammetric Engineering and Remote Sensing. Falls Church: American Society of Photogrammetry.

Proceedings of the First to Fourteenth International Symposia on Remote Sensing of Environment. Ann Arbor, MI.: Environmental Research Institute of Michigan.

Reeves, R.G., A. Anson and D. Landen eds. 1975. Manual of Remote Sensing. Falls Church: American Society of Photogrammetry.

Remote Sensing In Canada. C.C.R.S., V.1-V.8. Ottawa, Ont.: Energy, Mines, and Resources.

Science. Washington, D.C.: American Association for the Advancement of Science.

Slama, C.C., C. Theurer and S.W. Henriksen. 1980. Manual of Photogrammetry, Fourth Edition. Falls Church: American Society of Photogrammetry.

Smith, J.T. Sr. ed. 1968. Manual of Color Aerial Photography. Falls Church: American Society of Photogrammetry.

Thompson, G.E. ed. 1974. "The Applications of Remote Sensing and Benefits to Canada", Proceedings of the Second Canadian Symposium on Remote Sensing. Ottawa, Ont.: Energy, Mines, and Resources.

Thompson, G.E. ed. 1975. Third Canadian Symposium on Remote Sensing. Ottawa, Ont.: Canadian Aeronautics and Space Institute.

Thompson, K.P.B. ed. 1975. 4th Canadian Symposium on Remote Sensing. Ottawa, Ont.: Canadian Aeronautics and Space Institute.

Veziroglu, T.N. ed. 1975. Remote Sensing: Energy Related Studies. Toronto, Ont.: John Wiley & Sons.

Way, D.S. 1973. Terrain Analysis: A Guide to Site Selection Using Aerial Photographic Interpretation. Stroudsburg, Penn.: Dowden, Hutchinson, and Ross Inc.

Wenderoth, S. and E. Yost. 1975. Multispectral Photography. New York, N.Y.: Science Engineering Research Group, C.W. Post Center, Long Island University.

White, D. ed. 1972. "Resource satellites and remote airborne sensing for Canada", Proceedings of the First Canadian Symposium on Remote Sensing. Ottawa, Ont.: Energy, Mines, and Resources.

Zsilinszky, V.G. 1966. Photographic Interpretation of Tree Species in Ontario. Toronto, Ont.: Department of Lands, and Forests, Queen's Park.