

# EOS Retreat - April 16, 2009

## Report of Service Course Committee (*Harris, Bevier, Jones*)

Our mandate: *to guide curricular reform by  
determining core learning outcomes for  
students in our service courses*

### Outline

- Data considered
- What we did
- Recommendations



## EOSC Service Courses

- Courses considered:
  - EOSC 110, 111, 112, 114, 116
  - EOSC 310, 311, 312, 314, 315, 326\*
  - Note that we did not address the dual roles that 11X courses have in EOSC curricula

\*Requires 3<sup>rd</sup> yr standing in Science; not available to EOS students

## Who are these students?

SERVICE COURSE DEMOGRAPHICS (07W)				
Course Level	Gender (% F-M)	Year	Degree	% of students taking 2 or more EOSC courses
EOSC 11X	50-50*	(1+2) > (3+4)**	45-60% BA > 20-35% BSc > Others	20-40% for lecture courses (77% for EOSC 111 lab course)
EOSC 31X	60-40	4 > 3 > 2	55-70% BA >> 10-20% BCom > Others	30-35%

\*Except in EOSC 111 where 65-35

\*\*Except in EOSC 114DE (the only 1<sup>st</sup> yr DE course for which we have data), where 4>2>3>1

Note: EOSC 326 targets 3<sup>rd</sup> year and above Science except EOS

## Data Considered

1. Original EOS proposal to CWSEI
2. Demographics for service courses
3. Grades for all sections of all service courses
4. Learning goals for all service courses (fall 2008)
5. End of Term (EOT) Survey data for eos111, 112, 114, 116, 310
6. Midterm and EOT survey data since fall 2008 for some courses
7. Instructor interviews
8. Student interviews
9. Science course requirements for BA, BFA, BMus
10. Minimum high school sci/math courses required to enter UBC

## Data Considered

11. Survey of EOS undergrads
12. Analysis of ECAC (Earth Course Assistance Centre) usage
13. Current Department “goals” (UBC Calendar and EOS website)
14. Precedent (how other departments have tackled curriculum reform)
  - CurriculumSept12.doc (Sept 12th 2008) for the TIC committee
15. Fall 2007 CWSEI Teaching Practices Survey of all EOS teaching faculty
16. Student attitudes from SAESS data
17. Faculty of Arts “Liberal Arts Education for the 21st Century in a Research-Intensive University“ (cites what Arts students should know about science)

## What We Did

- Created draft list of goals for EOOSC service courses
  - Surveyed existing instructors of service courses (rank goals/comment)
  - Surveyed allfac (includes re-surveying existing service course instructors)
- Revised department-wide service course goals based on responses (see handout)

# Survey Results

Asked of all teaching faculty:

- "What do you think are the **most important** concepts, skills and attitudes that all students in EOS service courses should develop?"

Table 1: Collected results from all faculty.

Item #	CONCEPTS							SKILLS					HABITS AND ATTITUDES (learning and science)							
	1a	1b	1c	1d	1e	1f	1g	2a	2b	2c	2d	2e	3ai	3aii	3aiii	3aiv	3b	3ci	3cii	3d
critical	18	13	7	16	15	6	14	13	9	14	15	13	14	2	11	8	18	12	9	16
important	5	7	8	6	6	8	5	8	7	6	6	8	7	14	11	12	1	10	9	5
touched on	0	3	8	1	1	9	4	1	5	3	2	2	2	6	0	3	1	1	5	1
not relevant	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	0	0	0	0	0

NOTE: Top row values are the number of faculty indicating the corresponding concept, skill or attitude as "critical" for all students to develop. Bottom row values indicate number of respondents the goal "not relevant".

# Survey Results

Asked of service course instructors:

- "Please complete this form separately for each service course you teach. Think about that **one course** as you classify each of the numbered items on the scales provided."

Table 2: Collected results from service course instructors. See note below Table 1.

Item #	CONCEPTS							SKILLS					HABITS AND ATTITUDES (learning and science)							
	1a	1b	1c	1d	1e	1f	1g	2a	2b	2c	2d	2e	3ai	3aii	3aiii	3aiv	3b	3ci	3cii	3d
critical	17	15	12	19	13	6	6	12	8	7	4	3	18	5	5	2	16	20	2	7
important	9	9	6	8	11	8	11	9	3	3	10	12	6	5	5	12	9	6	7	14
touched on	3	4	10	2	3	15	12	8	13	15	14	13	3	5	12	11	2	3	10	6
not relevant	0	1	1	0	2	0	0	0	5	4	1	1	2	14	7	3	0	0	10	2

# Survey Results Comparison

Table 1: Collected results from all faculty.

Item #	CONCEPTS						SKILLS					HABITS AND ATTITUDES (learning and science)								
	1a	1b	1c	1d	1e	1f	1g	2a	2b	2c	2d	2e	3ai	3aii	3aiii	3aiv	3b	3ci	3cii	3d
critical	18	13	7	16	15	6	14	13	9	14	15	13	14	2	11	8	18	12	9	16
important	5	7	8	6	6	8	5	8	7	6	6	8	7	14	11	12	1	10	9	5
touched on	0	3	8	1	1	9	4	1	5	3	2	2	2	6	0	3	1	1	5	1
not relevant	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	0	0	0	0	0

Table 2: Collected results from service course instructors. See note below Table 1.

Item #	CONCEPTS						SKILLS					HABITS AND ATTITUDES (learning and science)								
	1a	1b	1c	1d	1e	1f	1g	2a	2b	2c	2d	2e	3ai	3aii	3aiii	3aiv	3b	3ci	3cii	3d
critical	17	15	12	19	13	6	6	12	8	7	4	3	18	5	5	2	16	20	2	7
important	9	9	6	8	11	8	11	3	3	10	12	6	5	5	12	9	6	7	14	
touched on	3	4	10	2	3	15	12	13	15	14	13	5	5	12	11	2	3	10	6	
not relevant	0	1	1	0	2	0	0	5	4	1	1	2	14	7	3	0	0	10	2	

## Examples of differences:

- Team work (item 3aii) is not considered worth developing in service courses by most.
- Actively involving students in experimental approaches seems less important in specific courses.

## Recommendations 1. Approve departmental learning goals for service courses (see Appendix 1 in handout)

### KNOWLEDGE AND MAJOR CONCEPTS

Students taking a service course in EOS will learn about:

- the spatial and temporal scales at which Earth's processes operate.
- how Earth changes through time.
- Earth's materials and their properties.
- Earth's systems and complex interactions.
- how Earth and humans are inextricably linked.
- the methods earth scientists use to collect and analyze evidence
- how to use evidence to evaluate earth science concepts and draw conclusions.

### SKILLS

Students taking a service course in EOS will develop their abilities to:

- read, visualize and interpret spatial representations of Earth science data.
- apply high school level math and science skills to real world settings.
- distinguish among evidence (data), models, assumptions, hypotheses, theories, interpretations, and predictions / recommendations in non-specialist readings or other media.
- reason with incomplete information.
- reason with and/or evaluate multiple working hypotheses.

### HABITS AND ATTITUDES

Service courses in EOS should actively help students to:

- employ appropriate learning skills for the Earth, ocean or atmospheric sciences, including:
  - identifying and using learning goals for the course, module or lesson
  - consciously assessing progress and modifying study actions
  - using feedback from instructors, peers, and/or self-reflection
- consider science as an ongoing endeavor that embraces curiosity, creativity and societal needs, and is not just a set of facts.
- recognize and experience two approaches used in the Earth system sciences, including:
  - historical, descriptive, systems-oriented approaches
  - experimental approaches
- ask "How do we know?", "Why do we accept it?", and "What is the evidence for ...?".

# Recommendations

2. Make this effort sustainable by:
  - a. Posting service course learning goals on EOS website, for individual instructor use
  - b. Establishing fall workshop(s), given by STLFs, for those new to teaching service courses or those who wish to revise existing courses, to guide implementation of these goals and to promote sharing of ideas amongst instructors
  - c. Providing a blank matrix for instructors to use to correlate service course goals with their existing course goals, to guide course reform (STLFs to provide) (see example next slide)

## Sample Goals Matrix

Use a  to link goals

Service course goals  
↓

Completed matrices will form part of greater EOS-SEI project deliverables re: curriculum reform

Your course goals →

Goals matrix, EOSC132

Course-level goals are horizontal. Department goals are vertical.

	1. Describe the system processes that have Earth's climate, and how they have changed over time by the surface fluxes.	2. Explain the influence of greenhouse gases on the climate system, and public services that depend on it.	3. Apply the knowledge of climate system processes to the design of a climate change mitigation strategy.	4. Explain the role of the climate system in the Earth system, and the role of the climate system in the Earth system.
Students taking a service course in EOS will learn about:				
1. The scientific and historical context of what Earth's processes are.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2. How Earth changes through time.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3. Earth's materials and their properties.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4. Earth's systems and complex interactions.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5. How Earth and humans are interacting.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6. The methods earth scientists use to collect and analyze evidence.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7. How to use evidence to evaluate earth science coverage and draw conclusions.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Students taking a service course in EOS will develop their abilities to:				
1. Apply evidence to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
13. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
14. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
16. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
17. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
18. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
19. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
20. Apply the scientific method to evaluate the scientific validity of earth science coverage.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

# Recommendations

3. Other curriculum sub-committees in EOS should use service course learning goals as a starting template for curriculum reform

