Curriculum Mapping

Indiana University South Bend

All programs must have a complete curriculum map in Taskstream that consists of at least two pieces:

1. maps all required/core courses and elective courses in relation to program student learning outcomes
2. maps all required/core courses and elective courses with course/program assessments.

Directions are posted in Taskstream and can be accessed by "checking out" the "curriculum map" requirement in the department workspace. Continue on for a complete overview of curriculum mapping with examples.

What is a Curriculum Map

A curriculum map is a graphical representation of the relationship between a program's courses/requirements and the program's student learning outcomes. A quote from **Sarkisian** and **Taylor's** 2013 article beautifully describes currriculum mapping:

> "Curriculum mapping is an intentional, systematic process that results in a graphic representation (curriculum map) of the relationships between courses, instructional activities, student learning outcomes, program objectives, and program goals. The curriculum mapping process conceptualizes curriculum as a system, emphasizing the interrelationships between courses and their cumulative impact on student learning, achievement, and development (Cuevas, Matveev, & Miller, 2010). A curriculum map, is therefore a visual representation of the curriculum, very much like a map of an unfamiliar country (Harden, 2001). Individual courses within the curriculum function like individual cities or landmarks on a traveler's itinerary. Each course contributes to the students' learning much like stopping in different cities and towns on the trip provides the traveler with pieces of information about the country and its people. Individual course syllabi, serve as the travel guides, describing what one should experience along the way, how long to stay, and how much to do in each place. Academic advisors serve as tour guides, while program faculty serve as docents to student

> travelers. A well constructed curriculum map charts the educational journey of an academic program for its students, giving them clear information about not only what is expected in each course, but how each course relates to program goals and objectives, making explicit what they will learn, and how they will learn throughout their program of study" (**Sarkisian and Taylor**, 2013).

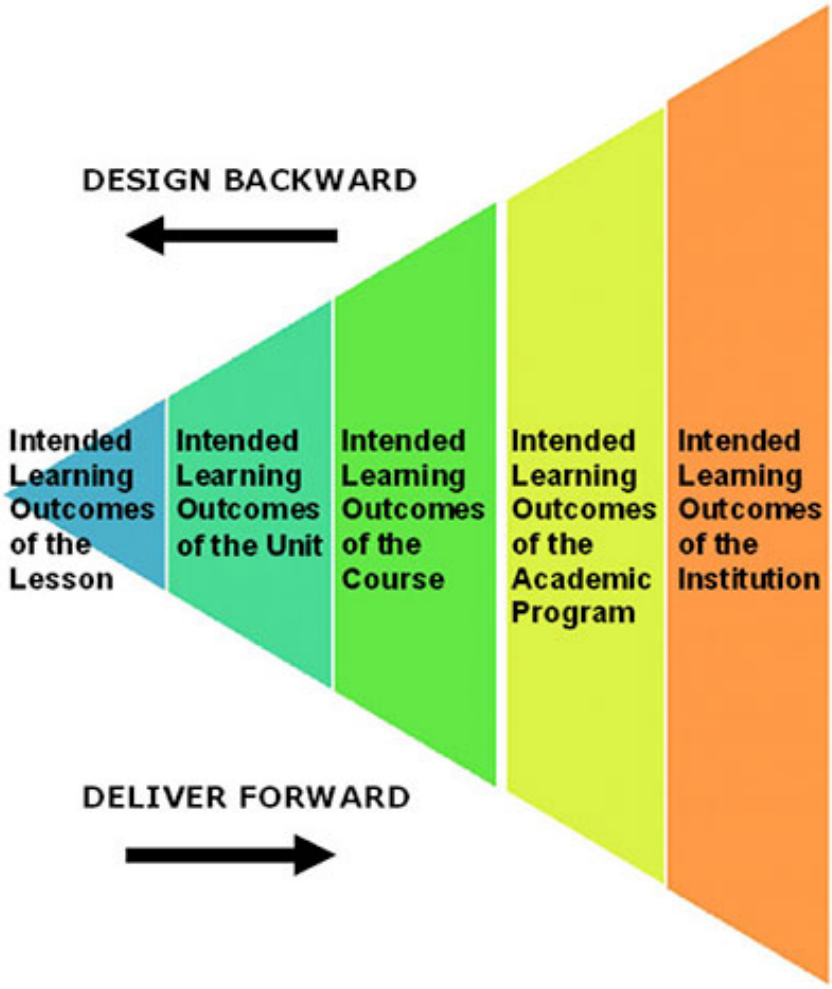
Curriculum maps identify where within the current curriculum student learning outcomes are addressed. Along the top program level student learning outcomes (PSLOs) are listed. Down the left side of the matrix all learning opportunities are listed. This includes all courses, internships and other learning opportunities provided to students. Curriculum maps display where in the curriculum students have opportunities to practice and demonstrate how well they meet program level outcomes. Creating a curriculum map documents the learning opportunities and provides insight into the curriculum.

Designing or Reviewing the Program

Start with the broad overarching outcomes expected of all students who complete the program. Work backwards from there working through courses down to units and lessons. Course outcomes are designed to lead to program level outcomes.

As students experience their first classes the learning outcomes should all lead and accumulate throughout the program of study. Students' knowledge and skills increase as they work through the program of study, each course building on the one before ending in a cohesive, integrated set of skills upon completion.

Learner-Centered Assessment on College Campuses: shifting the focus from teaching to learning by Huba and Freed, 2000)



Curriculum mapping is the vehicle used to identify where all student learning outcomes are met in the curriculum. It offers the ability to determine if learning outcomes match the current curriculum. Curriculum must be designed so that what students are expected to learn aligns with the learning opportunities provided. Analyzing this alignment is critical in determining gaps or redundancy and leads to curricular changes improving student learning and success.

First Step in Curriculum Mapping

- Identify all required components for degree or program completion. This includes required core courses, elective courses and any other requirements such as internships. List these in the left hand column.

- Program level student learning outcomes (PSLOs) are listed across the top row. In some literature these are called ‘goals’ or ‘objectives’. Here we will use PSLOs to keep it simple and consistent.

Table 1 :: Basic Curriculum Map

Courses/Requirements	PSLO1	PSLO2	PSLO3	PSLO4
Course 1	X			X
Course 2	X		X	
Course 3		X	X	X
Internship	X	X		
Exit Interview		X		X

Note :: PSLO=Program Student Learning Outcomes

Here program student learning outcomes (**PSLO**s) are mapped to learning opportunities.

If you haven’t already, you may also use a course alignment curriculum map. Here course level outcomes are shown as they relate to the program level student learning outcomes.

- SLOs for each component, i.e. Course level student learning outcomes, SLOs for internships, seminars, etc., are listed down the left. Match these to program level student learning outcomes across the top.
- The easiest way to do this is to pull all SLOs from course syllabi and match them up to the program level student learning outcomes.

Table 2 :: Course Alignment Curriculum Map

Course Level Student Learning Outcomes	PSLO 1	PSLO 2	PSLO 3	PSLO 4
Course 101 Outcome 1	I			I
Course 101 Outcome 2	I			
Course 101 Outcome 3		I		I
Course 101 Outcome 4	R	R		I
Etc.				
Course 201 Outcome 1	R	R	I	
Course 201 Outcome 2			R	
Course 201 Outcome 3		M		R
Etc.				

Note :: I=Introduced, R=Reinforced/Practiced, M=Mastered

Individual courses will not meet every program level student learning outcome. Ideally, it is the combination of the courses and other learning experiences as a whole that meet all of the PSLOs.

- If several courses are meeting the exact same outcomes are all of those courses needed? Or a different perspective, if the courses meet the same PSLOs students could take either course to meet the requirement.
- If PSLOs have changed over time, has the curriculum changed with it?
- As turnover occurs are the same student learning outcomes being met?
- When visiting or adjunct faculty teach are they meeting the agreed upon student learning outcomes for the course?

Next Step in Curriculum Mapping

- Identify where SLOs are being introduced, reinforced/practiced, and mastered
- Identify assessment information that is already being collected
- Match these to learning outcomes

Table 3 :: PSLOs with Mastery Level and Assessment

Courses/Requirements	PSLO1	PSLO2	PSLO3	PSLO4
Course 101	I	I CA	I	
Course 201	R CA			I
Course 301		R		R
Course 401		M		M CA
Course 490	M&R	M&R	M&R	M&R PA
Exit Interview	PA	PA		

Note :: I=Introduced, R=Reinforced/Practiced, M=Mastered (at exit or senior level), CA=Assessed for graded course level assignment, PA=Program level assessment related to SLOs

Build Cognitively

Curriculum should build and become more cognitively demanding as progression occurs through the degree program. In the beginning students ‘know’ or can ‘describe’ but as they get closer to graduation students are able to ‘create’ and ‘evaluate’. See Bloom’s et al.’s Cognitive Domain for further information.

Table 4 :: Curriculum Map
Based on Bloom's et al.'s Cognitive Domain

Courses/ Requirements	PSLO1	PSLO2	PSLO3
Course 101	Know	Describe	Know
Course 201	Apply		
Course 301		Apply	
Course 401		Create	
Course 490	Create & Evaluate	Evaluate	Create & Evaluate
Exit Interview	Create & Evaluate	Create & Evaluate	

In the process of developing a curriculum map it is helpful to list out key assignments for each course and their connection to the SLOs.

Table 5 :: Key Assignments

Courses/ Requirements	**PSLO1**	**PSLO2**
Course 301	• Annotated Bibliography • Literature Review	
Course 401	• Literature Review • Research Proposal	• Oral Presentation
Course 490 (Capstone)	• Research Proposal • Research Report	• Oral Defense

As faculty compile this, discussion regarding sequencing of curriculum naturally occurs. As this discussion and elaboration on specific assignments, where student learning outcomes are addressed and at what level ensues, remember that not every single learning outcome that is critical to you *personally* has to be addressed in the curriculum map. Only the larger overarching key ones need to be agreed upon and assessed. Think about exactly what a student needs to be competent in once they graduate with their degree to succeed in their field.

Table 6 :: Curriculum Map
PSLOs with Mastery Level and Assessment

Courses/ Requirements	**PSLO1**	**PSLO2**	**PSLO3**
Course 101	I: 3 Oral Presentations	I: Exam Questions	IL Essay Exam
Course 201	R: 2 Oral Presentations		R: Essay Exam
Course 301		R: Exam Questions	R: Course Portfolio
Course 401		M: Project	
Course 490	M&R: 3 Oral Presentations	M&R: Project	M&R: PA: Project
Exit Interview	PA: Interview	PA: Interivew	PA: Interview

Note :: I=Introduced, R=Reinforced/Practiced, M=Mastered (at exit or senior level), PA=Program level assessment related to SLOs

Purpose of Curriculum Mapping

Looking at the curriculum map above with all of the assignments, mastery level and assessment data enables a view of the entire curriculum. As students progress through their program and areas in need of improvement are noticed the curriculum map is a critical tool used to determine where these improvements could be made. For example, let's pretend that for PLSO1 the only time there was an oral presentation was at the end of the program in course 490. Let's say PLSO1 is an oral communication student learning outcome. At the end of the program right before graduation during interviews faculty noticed that the majority of students were not presenting orally as well as they thought they should be able to. Looking at the curriculum as a whole allows visualization of this issue. Perhaps everyone thought students were getting this practice in someone else's course, when they were only getting this skill in one course, the 490 course. Having the curriculum mapped out and connected to SLOs makes this discussion and solution much easier. In this case to correct this issue, faculty decided to *formally* introduce oral presentation skills early in the program (3 oral presentations in Course 101) and to also have additional opportunities for practice in other courses (2 oral presentations in Course 201). Faculty could then examine this SLO again in a few years after implementation to see if students' oral communication skills during interviews improved.

Benefits of Curriculum Mapping

- **Benefits for the Program**
  - Ensures students have sufficient opportunity to master specific outcomes
  - Ensures all courses/requirements contribute to student success
  - Ensures curriculum cohesiveness
  - Identifies the link between SLOs and curriculum
  - Identifies where evidence for program level assessment can be collected

- **Benefits for Faculty**
  - Identifies how each course contributes to the entire curriculum (course outcomes mapped to program level outcomes)
  - Aligns instruction with SLOs

- Demonstrates degree to which the curriculum supports student learning
- Encourages reflective practice
- Catalyst for discussion regarding course sequencing
- Improves communication

- **Benefits for Students**
  - Enables students to visualize connections in their degree program
  - Helps students get the 'big picture' of the curriculum
  - Helps students understand how courses connect and build their skills
  - Enables students to take responsibility for their learning

University of Hawaii-Manoa
Curriculum Mapping / Curriculum Matrix

Part 1. What is it? Why do it?
Part 2. What does a curriculum map/matrix look like?
Part 3. How is a curriculum map created?
Part 4. What are some best practices?

See also: workshop presentation slides and handouts

- *Facilitating Program Assessment Decision-making (with a curriculum mapping example)* (2013)
- *Curriculum Map: An Elegant and Powerful Tool in Your Assessment Toolbox* (2011)
- *Make the Most of Your Curriculum Map* (2011)
- *Curriculum Mapping for Graduate Programs* (2010)
- *An Introduction to Curriculum Maps* (2009)
- *Learning Outcomes and Curriculum Maps* (2009)
- *Learning Outcomes and Curriculum Maps* (2008)

1. What is it? Why do it?

Curriculum mapping is a method to align instruction with desired goals and program outcomes. It can also be used to explore what is taught and how.
The map or matrix:

- Documents what is taught and when
- Reveals gaps in the curriculum
- Helps design an assessment plan

Benefits:

- Improves communication among faculty

- Improves program coherence
- Increases the likelihood that students achieve program-level outcomes
- Encourages reflective practice

2. What does a curriculum map/matrix look like?

It's a table with one column for each learning outcome and one row for each course or required event/experience (or vice versa: each row contains a course and each column lists a learning outcome).

EXCERPT FROM A HYPOTHETICAL BIOLOGY PROGRAM CURRICULUM MATRIX
Key: "I"=Introduced; "R"=reinforced and opportunity to practice; "M"=mastery at the senior or exit level; "A"=assessment evidence collected

Courses	Intended Student Learning Outcomes			
	Apply the scientific method	**Develop laboratory techniques**	**Diagram and explain major cellular processes**	**Awareness of careers and job opportunities in biological sciences**
BIOL 101	I	I		I
BIOL 202	R	R	I	
BIOL 303	R	M, A	R	
BIOL 404	M, A		M, A	R
Other: Exit interview				A

EXAMPLE FROM A PHD PROGRAM
(SLO=student learning outcome)

PhD Requirements	SLO 1	SLO 2	SLO 3	SLO 4
Course Requirements	X			
Qualifying Exam		X	X	
Comprehensive Exam	X	X		X

Dissertation	X	X	X	
Final Examination	X	X	X	
Seminar Requirements		X		XX

EXAMPLE FROM A PROGRAM WITH MULTIPLE PATHS TO DEGREE

Requirements: Track 1	Requirements: Track 2	Requirements: Track 3	SLO 1	SLO 2	SLO 3	SLO 4	SLO 5
Core: CRS 255 (3 credits)			I	I	I	I	I
Core: Three theory courses (9 credits)				I	I		
Core: Writing (3 credits)			I			I	I
Core: Design (3 credits)				I		I	
CRS 310, 312, 350				R		R	
CRS 325			R	R			
CRS 355				R	R		
CRS 405						R	R
CRS 410					R		
CRS 450				R	R		
CRS 455			R				R
CRS 495			A	A	A	A	A
	CRS 215, 315				R	R	R
	CRS 316			R		R	
	CRS 318		R		R	R	
	CRS 320, 415			R		R	
	CRS 420				R	R	R
	CRS 495		A	A	A	A	A
		CRS 352	R				R
		CRS 360		R	R		

		CRS 382	R				
		CRS 385				R	R
		CRS 460	R				R
		CRS 480	R	R		R	
		CRS 485	R	R			
		CRS 495	A	A	A	A	A

SLO-student learning outcome; I-introduced; R-reinforced/practiced; A-assessed

EXAMPLE FROM CIVIL & ENVIRONMENTAL ENGINEERING that shows the degree each SLO is emphasized in each course (1=some emphasis, 2=moderate emphasis, 3=significant emphasis).

Table 1 Core curriculum linkages to program outcomes

Semester	Outcomes / Course	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*
Freshmen Fall	Eng 100							3	2			2
	Math 241	3										2
	Chem 161 & 161L	3	2									1
	FG Global and Multicultural Perspectives								3			
Freshmen Spring	Math 242	3										2
	Phys 170 & 170L	3	3									2
	Chem 162	3										1
	EE 160 or ICS 111	3		1					1			3
Sophomore Fall	CEE 270	3				3	1		1	1	1	3
	Math 243	3										2
	Phys 272 & 272L	3	3	1								2
	FG Global and Multicultural Perspectives								3			
	DH Hum. Div. Req. or DL Lit. Div. Req.								3			
Sophomore Spring	CEE 271	3				2	1					
	Math 244	3										2
	CEE 370 & 370L	2	3	1	1	3	1	3		1	1	1
	Biological science elective	3							3			
	Sp 251							3	2			
Junior Fall	CEE 305	3	1	1		2	1		1		1	1
	CEE 320	3	3		2	2	1	3		1	1	
	CEE 361	1					1	1	2	1	3	1
	DS Social Sci. Div. Req. Econ. Elect.								3			
	Math Elect - ME403,GG312,Math302/307	3										2
Junior Spring	CEE 330	3	2	1	1	2	1	1	2		2	3
	CEE 355	3	3		3	2		2	1	1	1	2
	CEE 375	1	3	2	1	1	1	2	1	2	2	2
	CEE 381	3				2				1		2
	DS Social Science Div. Req.								3			
Senior Fall	CEE 461,	3	1	2	1	3	1		1	1		2
	CEE 462 or	1	1		2		1	3		3	1	1
	CEE 464	2	1		3	1	1	2	3	3	1	2
	CEE 472,	1			1	1	1		1	1	1	
	CEE 473 or	1		1		1	1	1	1	1	1	1
	CEE 474	1		2		2	2	2	2	2	2	2
	Technical Elective[2]	See below										
	Technical Elective[2]	See below										
	CEE 489B	1			1	1	1			1		2
	CEE 489C						3		1	1	1	
Senior Spring	CEE 421 or	3	2	3	1	3	2	1	2	2	1	3
	CEE 431	3		2		3			2	2	2	3
	CEE 455	3	1	2		3	1		1	1		3
	CEE 490	3		3	3	3		3	3	2	3	3
	Technical Elective[2]	See below										
	Technical Elective[2]	See below										
PROGRAM OUTCOME SUM TOTAL[3]		70	25	14	13	30	15	21	39	17	18	48

Notes:

1. "blank" = no emphasis; 1 = some emphasis; 2 = moderate emphasis; 3 = significant emphasis
2. A list of technical electives and their curriculum linkages to program outcomes are provided below.
3. When calculating the program outcome sum total, the columns are summed using the lowest possible weighting scale if students have a choice among courses (e.g., for outcome *a*, CEE 462 has the lowest weighting scale among the CEE 46X courses. It is used to compute the sum.)

Technical Electives

Outcomes / Course	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*
CEE 424	3	3	2	2	3	2	2	2	2	2	3
CEE 432	3	2	1	1	3	1	2		1	1	3
CEE 471	1				1	1		1	1	1	
CEE 476	1		2		1	1		2	2	2	2
CEE 482	3				2				1		2
CEE 485	3	3	2	2	3	1	2	1	2	2	2
CEE 486	3		3		3	1	1	1	2	2	2
CEE 491[a]	1		3	3	2	1	3	3	2	2	2
CEE 491[b]				2			3	2		1	3

a. Sustainable Construction
b. Policy and Infrastructure

3. How is a curriculum map created?

1 Faculty members begin with a) the program's intended student learning outcomes, b) recommended and required courses (including General Education courses if appropriate) and c) other required events/experiences (e.g., internships, department symposium, advising session, national licensure exams)

2 Create the "map" in the form of a table

3 Mark the courses and events/experiences that currently address those outcomes

- Enter an "I" to indicate students are introduced to the outcome
- "R" indicates the outcome is reinforced and students afforded opportunities to practice
- "M" indicates that students have had sufficient practice and can now demonstrate mastery
- "A" indicates where evidence might be collected and evaluated for program-level assessment (collection might occur at the beginning and end of the program if comparisons across years are desired)

4 Faculty members analyze the curriculum map. They discuss and revise so that each outcome is introduced, reinforced/practiced, and then mastered. In addition, each outcome should have an "A" to indicate that evidence can be collected for program-level assessment.

4. What are some best practices?

- Build in practice and multiple learning trials for students: introduce, reinforce, master. Students will perform best if they are introduced to the learning outcome early in the curriculum and then given sufficient practice and reinforcement before evaluation of their level of mastery takes place.
- Use the curriculum map to identify the learning opportunities (e.g., assignments, activities) that produce the program's outcomes.
- Allow faculty members to teach to their strengths (note: each person need not cover all outcomes in a single course). "Hand off" particular outcomes to those best suited for the task.
- Ask if the department/program is trying to do too much. Eliminate outcomes that are not highly-valued and then focus on highly-valued outcomes by including them in multiple courses. (The eliminated outcomes can still be course-level outcomes. They need not disappear completely from the curriculum.)
- Set priorities as a department/program. Everyone working together toward common outcomes can increase the likelihood that students will meet or exceed expectations.
- Communicate: Publish the curriculum map and distribute to students and faculty.
- Communicate: Each faculty member can make explicit connections across courses for the students. For example, at the beginning of the course or unit, a faculty member can remind students what they were introduced to in another course and explain how the current course will have them practice or expand their knowledge. Do not expect students to be able to make those connections by themselves.

The Assessment Office can tailor a curriculum mapping workshop for your program. Call or email airo@hawaii.edu to schedule.

Sources consulted (July 2008):

- "A Skills Matrix as a Geology Department Planning Tool" by Savina, Buchwald, Bice, Boardman. Carleton College. November 6, 2001. www.carleton.edu/departments/geol/faculty/msavina/Copy%20of%20GSA2001.ppt
- Welcome to Curriculum Mapping 101 by Teach Resources. http://www.curriculummapping101.com/
- "Curriculum Mapping: What is it?" A Practical Explanation from Least Tern. http://library.csun.edu/kdabbour/pdfs/WhatIsCurricMapping.ppt.pdf