

Curriculum transformation: Redesigning a construction management program to a vertically and horizontally integrated curriculum with authentic project-based learning

Polytechnic Summit
June 6, 2017



CONSTRUCTION MANAGEMENT

TRANSFORMATION BACKGROUND

- **Challenge:** Transform curriculum into an innovative learning environment that creates a seamless transition from college to industry
- **Inception** during CM Faculty/Staff fall 2015 retreat
- **Implementation** in stages beginning Fall 17' for the freshman class
- **Concept:** Horizontal and vertical integration of student learning outcomes in a project-based, authentic, team taught environment

CONSTRUCTION MANAGEMENT

TRANSFORMATION TEAM

- **Initial transformation team**

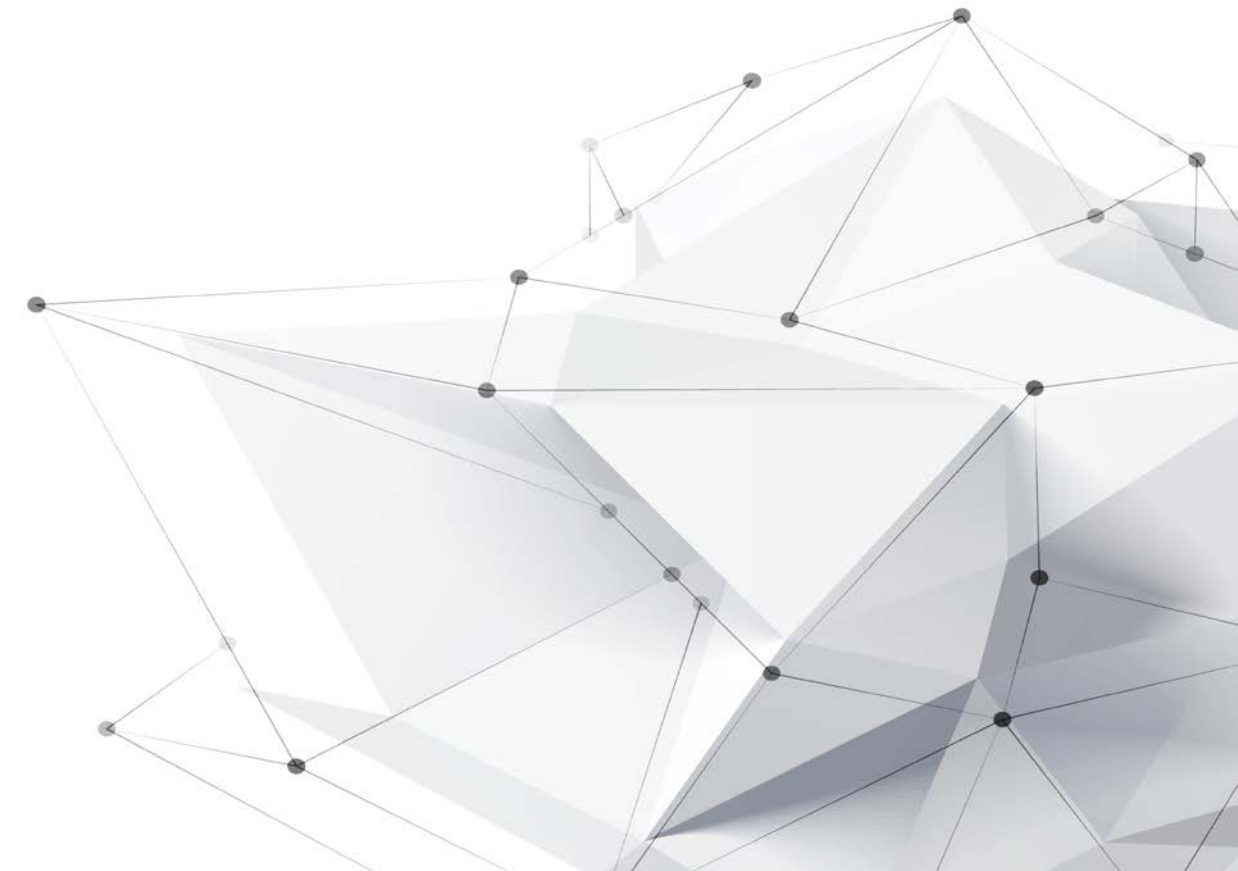
- **Brad Benhart**
- **Bryan Hubbard**
- **Jamie Metzinger**
- **Patti Morgan**
- **Scott Santon**

- **Team additions**











- **James Jenkins**
- **Daphene Koch**
- **Cy Rangel**
- **Mark Zimpfer**

***Note: all CM faculty involved and contributing to the process**

FALL 2015 – SPRING 2016



CONSTRUCTION MANAGEMENT TRANSFORMED CURRICULUM

	Estimating	Scheduling	Safety	Communications	Ethics	Soils	BIM		Const. Layout	Project Delivery	QA/QC	Legal	Sustainability	Structures	MEP			
4	Construction Capstone I						COM / English Select	Business Select	Econ	Construction Capstone II						Const Work Exp II	Elective	Global Select
3			Advanced Pre-Construction Management					MGMT Select	Human Select			Advanced Construction Management				Const Work Exp I	Elective	MGMT
2			Intermediate Pre-Construction Management					MGMT	Physics			Intermediate Construction Management				Elective	Science Select	
1			Introduction To CM		Design Thinking for Tech		Computer Graphics	English	Math			Construction Management Fundamentals		OSHA 10-HR	Elective	Oral Comm	Math	

BENEFITS OF PROJECT BASED LEARNING & TEAM TEACHING

STUDENT BENEFITS

- **Dynamic IMPACT style program in an authentic environment**
- **Subject areas are interconnected from day one**
- **Stronger faculty interactions in a small group**
- **Increased instructor variety over semester and curriculum**
- **Designated time for mentoring**

FACULTY BENEFITS

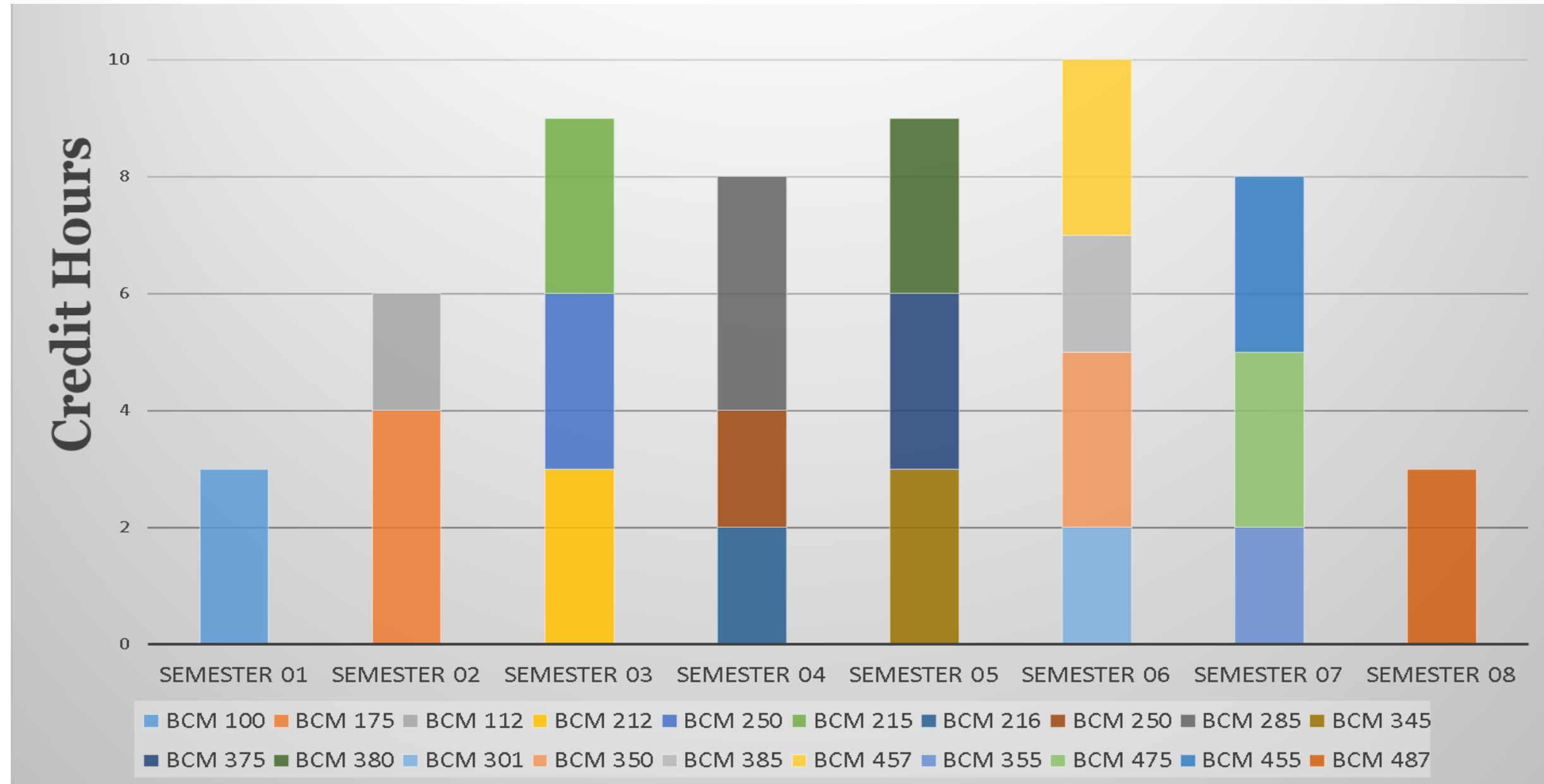
- **Schedule Flexibility**
 - **Larger time slots for research and grant writing**
 - **Increased opportunity for conferences and publication presentations**
- **Mentoring opportunities with students from day one of their freshman year**
- **Continuous improvement of teaching and assessment methods in team teaching atmosphere**

LAYING THE GROUNDWORK

TACKLING THE LOGISTICS FIRST

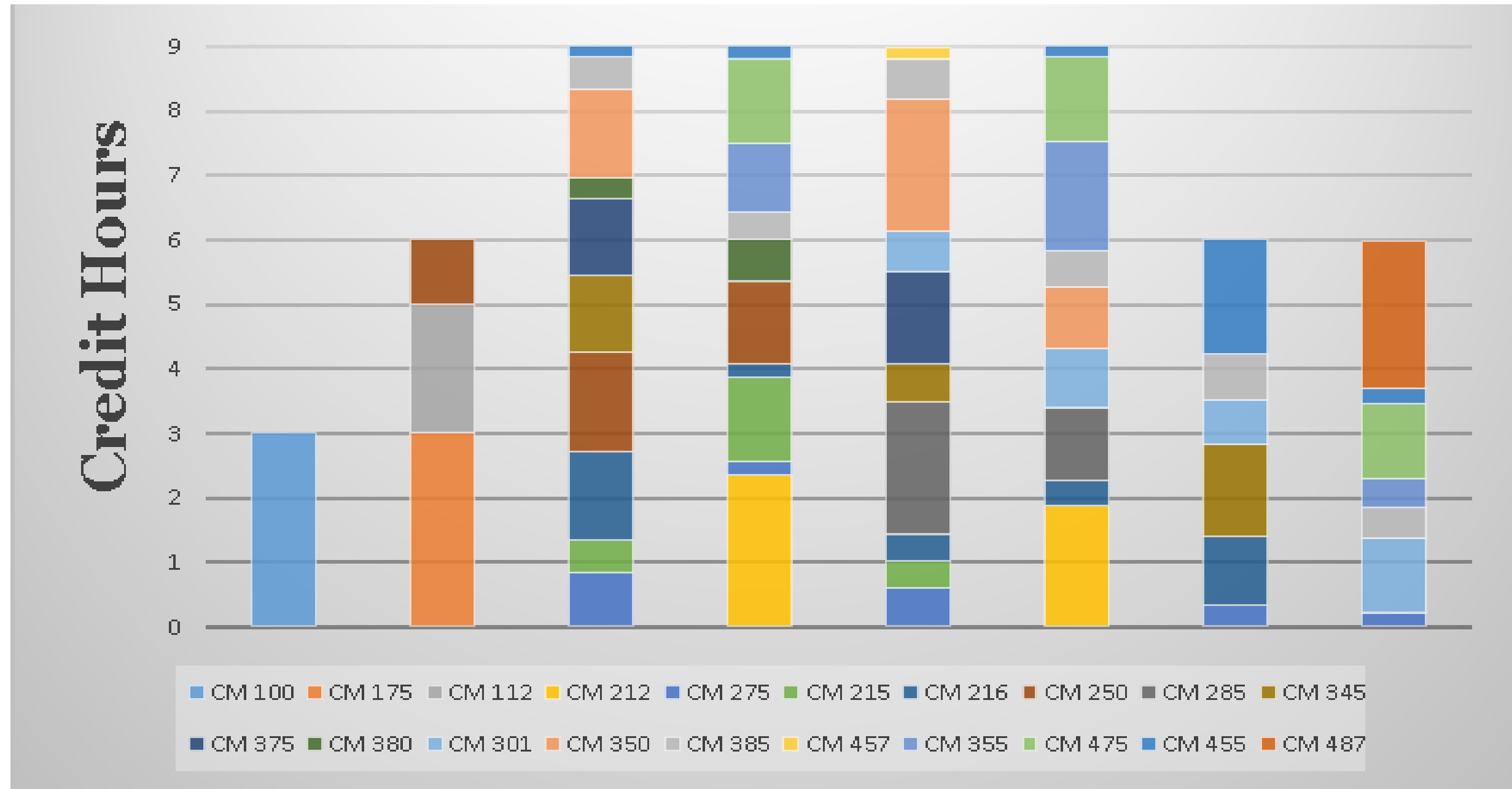
- **Meetings with those who know the systems best. Things to consider:**
 - What can and cannot be changed in current curriculum?
 - What schedule conflicts will arise with outside courses?
 - Partnering with other departments, what is in it for them?
 - Does Purdue have the space to support the new course set up?
 - How will this affect:
 - Articulation agreement with Ivy Tech?
 - Study abroad students?
 - Part-time students?
 - CODO students?
 - Students taking general education courses elsewhere?
 - How will the courses be managed?

CURRENT PLAN OF STUDY



- Current Plan of study provides content in subject-oriented courses without strong connections to other subjects
- The new curriculum breaks down course content into modules which can be taught independently and interconnected with other subjects and a real world project

PROPOSED PLAN OF STUDY



- Course content is redistributed for appropriate level (vertical integration) and connection with other subjects (horizontal integration)
- Rather than multiple separate courses each semester, students will take one integrated course

PROPOSED PLAN OF STUDY

REVISED PROPOSED Plan of Study - 120 Total Credit Hours			
Fall First Year		Spring First Year	
3	CM 10000 Intro to Const Mgmt	6	CM 15000 Const Mgmt Fundamentals
3	MA 15800*	1	CM 11000 Const OSHA 10-HR Cert
3	English Composition Selective*	3	MA 16010*
3	TECH 12000*	3	Communication Foundation Selective
2	CGT 16400	3	Free Elective
14	Total Credit Hours	16	Total Credit Hours
Fall Second Year		Spring Second Year	
9	CM 20000 Intermediate Pre-Con Mgmt	9	CM 25000 Intermediate Const Mgmt
4	PHYS 21800*	3	Lab Science Selective*
3	MGMT 20010	3	Free Elective
16	Total Credit Hours	12	Total Credit Hours
Fall Third Year		Spring Third Year	
9	CM 30000 Advanced Pre-Con Mgmt	9	CM 35000 Advanced Const Mgmt
3	Humanities Foundation Selective*	1	CM 39000 Construction Work Exp I
3	Management Selective	3	MGMT 45500
		3	Free Elective
15	Total Credit Hours	16	Total Credit Hours
Fall Fourth Year		Spring Fourth Year	
6	CM 40000 Construction Capstone I	6	CM 45000 Construction Capstone II
3	ECON 21000 or AGECE 21700*	1	CM 49000 Construction Work Exp II
3	Business Selective	3	Global Selective**
3	Advanced COM or ENGL Selective	3	Free Elective
		0	Intercultural Requirement
15	Total Credit Hours	13	Total Credit Hours
*University Core Requirement		CM Required Courses	
**Polytechnic Requirement		ACCE Gen Ed Required Courses	

(3) 1-credit hour courses

OSHA 10-hour certification

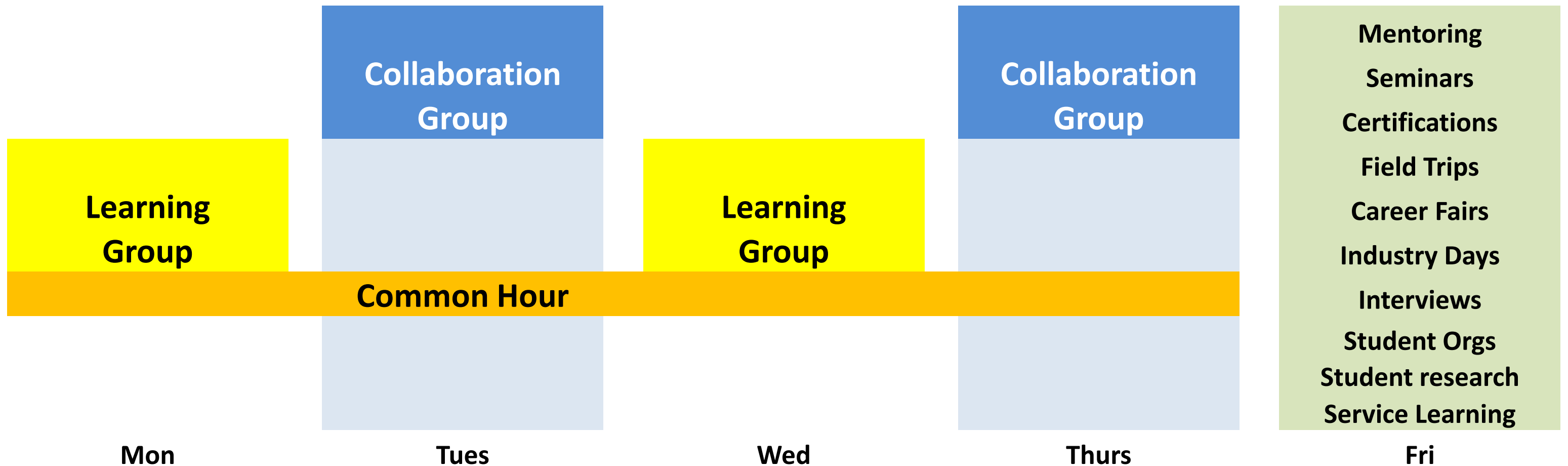
Work Experience: students are required to complete 800 hours of internship experience

OSHA 30-hour certification included in CM 30000

Concentration Areas:

- Commercial
- Residential
- Healthcare
- Mechanical & Electrical
- Demolition & Disaster Restoration

TYPICAL STUDENT WEEK



- All courses will be scheduled for Monday through Thursday leaving Fridays available for activities such as mentoring and job site visits
- The learning groups will bring together all of the students within a class for course activities
- The collaboration groups will divide the students into smaller sections to work more with hands-on learning tasks
- The common hour provides a time where no CM courses are scheduled to allow for items such as student/faculty collaboration and guest speakers

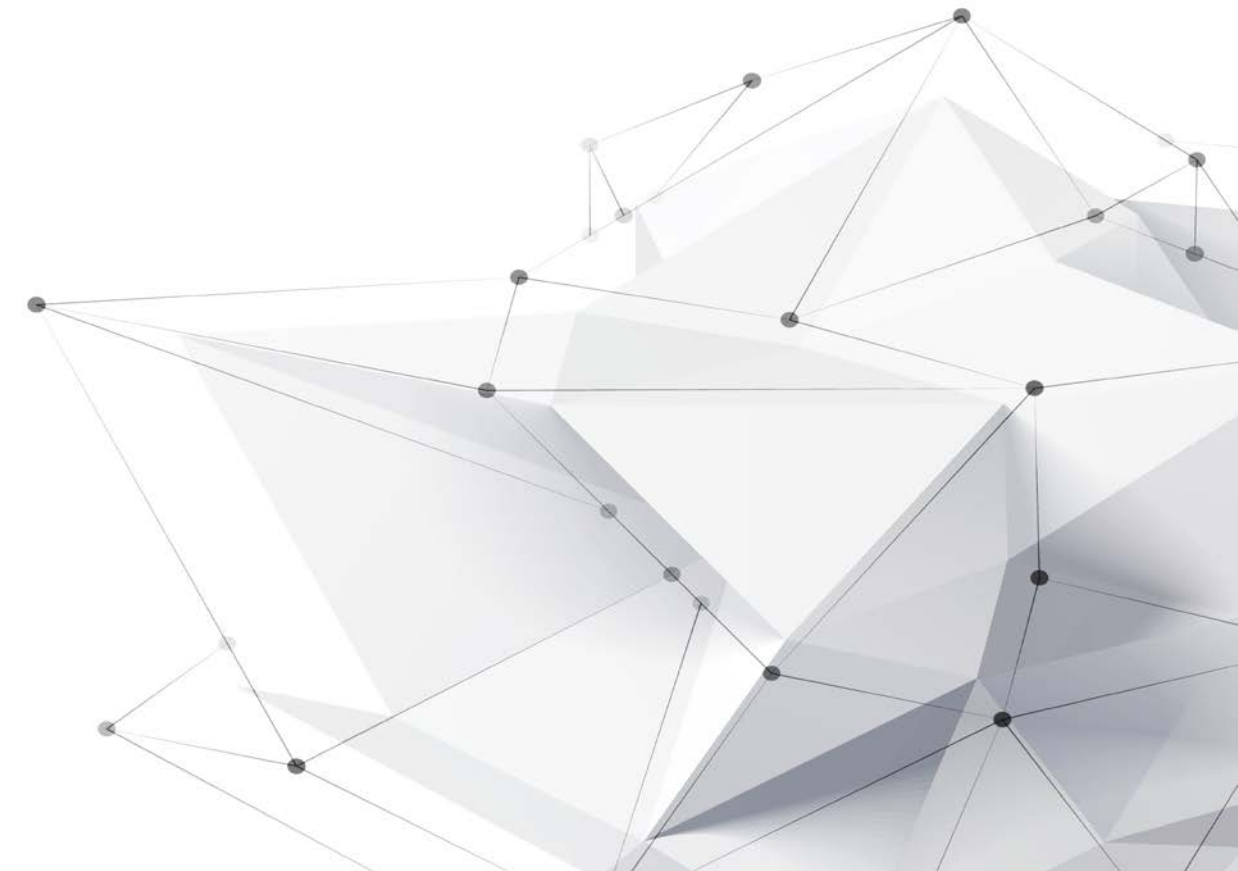
POTENTIAL SCHEDULE

Monday / Wednesday				
7:30		4B Lab	2B Lab	3B Lab
8:30	2A Lecture	4B Lab	2B Lab	3B Lab
9:30		4B Lab		
10:30		4B Lab	2B Lab	3B Lab
11:30	4A Lecture	4B Lab		
12:30				
1:30	Common Hour (No CM Classes)			
2:30	3A Lecture		2B Lab	3B Lab
3:30		1B Lecture		
4:30				

- Minimize overlap of lecture sections
- Accommodate team teaching approach
- Provide students opportunity to accelerate Plan of Study

Tuesday / Thursday					
7:30		4A Lab	2A Lab	3A Lab	1B Lab
8:30	2B Lecture	4A Lab	2A Lab	3A Lab	1B Lab
9:30		4A Lab			1B Lab
10:30		4A Lab	2A Lab	3A Lab	1B Lab
11:30	4B Lecture	4A Lab			1B Lab
12:30					
1:30	Common Hour (No CM Classes)				
2:30	3B Lecture		2A Lab	3A Lab	
3:30		CM 10000 Power Hour			1B Lab
4:30					

SUMMER 2016 – SPRING 2017



“PUTTING THE MEAT ON THE BONE”

FACULTY RETREATS – INITIAL COURSE OUTCOMES, OBJECTIVES & SCHEDULES



- Feedback from Center for Instructional Excellence
- Mapping modules to ACCE learning outcomes
- Assigning topics to project courses
 - Pre-Construction vs Construction
 - Level of instruction

- Bloom’s Taxonomy: Assigning action verbs to objectives
- Sample Course Schedules: Color coded by learning outcome

1B Sample Spring Semester - 6 credit hour					
Week	Hour	Lecture	Lab	Lecture	Lab
1	1	Introduction to Course	Introduction to Lab Space	Contract Documents	Surveying Software & Web Search (Group)
	2	Introduction to Projects	Safety / Assign lockers / etc	Introduction to Surveying & Layout	Tool Basics and Measuring
2	1	MLK JR. DAY	Math Review, Notekeeping	Mistakes & Errors, Accuracy & Precision	Foundations & Excavation
	2		Pacing Distances	Contract Documents	Soils & Sitework
3	1	Distance Measure by Chaining	Measure w/ 100' tape, angle w/ chain	Team Members, Roles & Responsibilities	Project 01
	2	Masonry & Mortar	Masonry & Mortar	Look & Act Professional	
4	1	Electronic Distance Measurement	Check Distances w/ Total Station	Measuring Angles	Setup over point & Turning angles
	2	Concrete Material	Concrete Formwork Layout	Write a Formal Letter	Write & Format Letter

PROJECTS FOR NEW CURRICULUM – BUILDING THE LIBRARY



- Industry partners will provide all project documentation to assist with building our project library
- Projects will provide consistency and give students a common frame of reference for each course
- Potential to partner with Purdue Physical Facilities and construction projects on Purdue's campus

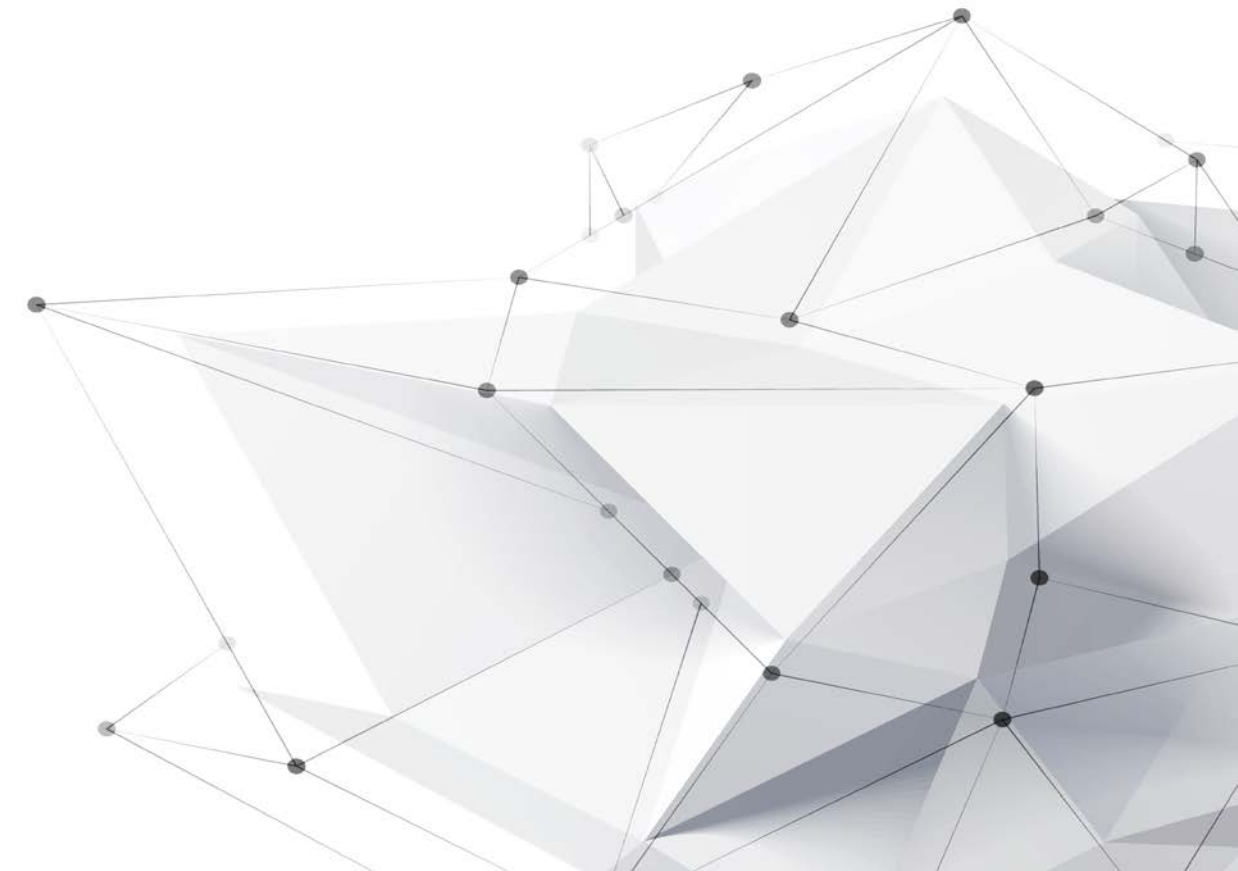


WORKING AS A TEAM

FACULTY INVOLVEMENT

- **Course Collaborations**
 - Horizontal and/or vertical integration
 - Team teaching practice
- **Curriculum Document approval**
 - Faculty passed curriculum change
 - Approved by the Polytechnic Faculty Senate
- **Project Course Teams**
 - CM faculty divided into teams to tackle individual project courses
 - Faculty retreat to bring all teams together to help clearly define what a CM student should be able to do at the end of each course/year

SUMMER 2017 – ???



IMPLEMENTATION SCHEDULE

Class	Academic Year				
	2016-17	2017-18	2018-19	2019-20	2020-21
Freshmen	Current Curriculum (POS)	New Curriculum (POS)	New Curriculum (POS)	New Curriculum (POS)	New Curriculum (POS)
Sophomores	Current Curriculum (POS)	Current Curriculum (POS)	New Curriculum (POS)	New Curriculum (POS)	New Curriculum (POS)
Juniors	Current Curriculum (POS)	Current Curriculum (POS)	Current Curriculum (POS)	New Curriculum (POS)	New Curriculum (POS)
Seniors	Current Curriculum (POS)	Current Curriculum (POS)	Current Curriculum (POS)	Current Curriculum (POS)	New Curriculum (POS)



- Freshmen starting Fall 2017 will be in new POS – Courses CM 10000 and CM 15000 with CM 11000
- Second year bring online 20000 and 25000
- Third year bring all remaining Project Courses and supporting courses online and transfer seniors into new program – December grads may require old POS
- By Fall 2020 all old BCM courses will be expired
- CODO & Transfer Students placed depending on graduation date

WHERE WE ARE AND WHERE WE ARE GOING

THIS SUMMER AND BEYOND

- **Course Management**
 - Pairing up teaching and research faculty
- **Standardize Syllabi & Grading System**
 - Competency Based?
 - Developing assessment tools & activities
- **Program Handbook for Students & Faculty**
- **Integration of History of Construction**
- **Writing across the curriculum**
- **Intercultural Requirement**
- **Simulations & “Challenges”**
- **Service Learning Projects**
- **Textbooks**
- **Space**
- **Procore – construction management system**

Thank You!
Questions?

