Building Science Matters
In Construction Education & Research

Virginia Tech
Invent the Future®

the MYERS-LAWSON SCHOOL of construction

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Drivers for Building Science Education

- Job Opportunities
- Trade “Needs”
- Accreditation Requirements
- Risk Management
- Quality Control
- The “environmental” reasons
- HBPs, ZEBs …
Job Opportunities
Reality Check for Construction

Number of offers

100% Placement

Low: >1

Average ~ 2-3

Top: 7-8

Starting Salaries

40k-50k
50k-60k
60k +
Construction “Needs” from Education

**Student View: BS YES (?)**

- Students in CM like hands-on stuff
- They are curious about High Performance ... ... to some part
- They want to make good money ...
- Don’t know enough about other opportunities

**Industry View: BS NO(!)***

- Already not enough graduates across sectors (GC, MEP, ...)
- “Need” (i.e. want) solid estimating & scheduling skills
- Leadership, Safety, QM

*) depending on whom you ask
CM Accreditation (ACCE, ABET, ...)

Current ACCE Accreditation

- **Huge matrix** of learning outcomes
- **Requirement to allocate** (bean count) those in programs and split course hours by attribution
- E.g. xy hours of physics

Future ACCE Accreditation

- 20 learning **objectives**
- 6 levels of depth “requirements”
- Just two documents per learning objective
- Can be demonstrated in a single course
Verbs according to Bloom’s taxonomy

• **Create:**
  At the highest level, students are producing new ideas or products that integrate the knowledge they have gained.

• **Evaluate:**
  At this stage, students are asked to judge an idea.

• **Analyze:**
  Students begin to develop higher order thinking.

• **Apply:**
  At this level, students begin to put the information they are learning into context.

• **Understand:**
  At this level students demonstrate that they understand the content by explaining, summarizing, ... information.
Understand ... 

At this level students demonstrate that they understand the content by explaining, summarizing, ... information.
Student Learning Outcomes for ACCE

1. Create appropriate written communications...
2. Create appropriate oral presentations...
3. Create a safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze decisions based on ethical principles.
7. Analyze documents...
8. Analyze methods, materials, and equipment...
9. Apply skills in a multi-disciplinary team.
10. Apply electronic-based technology...
Student Learning Outcomes for ACCE

- 11 Apply basic surveying techniques ...
- 12 Understand ... methods of project delivery ...
- 13 Understand construction risk management.
- 14 Understand ... accounting and cost control.
- 15 Understand ... quality assurance and cost control.
- 16 Understand ... project control processes.
- 17 Understand ... the legal implications.
- 18 Understand ... principles of sustainable constr.
- 19 Understand ... principles of structural behavior.
- 20 Understand ... basic principles of MEP.
Accreditation a Driver for BS in CM?

**Bad News**
- It’s not on the radar

**Good News**
- It doesn’t matter

Accreditation defines
- the minimum standard
- not the future
(Real) Drivers for BSE in CM

**Design-Bid-Build**

- Traditional focus on
  - Estimating
  - Scheduling
  - Contract communication (written & oral)

**Design-Build, IPD, etc.**

- Shift focus to
  - QM
  - Legal
  - Sustainability
  - Integration
What is central to the new buzzwords of the industry?

- High Performance
- Resilience
- Energy Efficiency

BECx
Design Change – Change Orders

• Change orders are a reality on every job
  – Worst enemy of building (construction) performance
  – CM holds the biggest opportunity
Why is this important for CMs?

- Construction Management has a unique position between design and occupation/operation.
- It is often the last and maybe the only opportunity to (effectively) influence decision making.
- With opportunity comes responsibility...
Where to infuse Building Science?

- **Material Courses**
  - Move away from concrete and steel only
  - **Building enclosure materials and systems**
  - Typically more time available in these type of courses

- **Building Systems Courses**
  - Move away from classic MEP course
  - **Building enclosure as a system**
  - Challenge is to find time within the already enormous content to be covered in these courses

- **Physics Courses**
  - Move away from generic two physics courses
  - **Introduction to building physics**
Virginia Tech – BC Curriculum Revision

Co-taught with BC 5314
Applied Building Sciences
Any questions?