

STEM ... and Transfer: Solving the Problem

Please fill out the brief “Pre-Seminar Survey” at:
<http://step.truman.edu/cota>



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Truman’s STEP (STEM Talent Expansion Programs) Office



Partnering with three Missouri community colleges
(2004-present)



The Problem

- Graduation rates and time to graduate for 2-year transfer students in STEM are lower than non-STEM and non-transfer peers

Missouri students	Graduation rate (after 4 years)
2-year transfer (all students)	50%
2-year transfer (STEM only)	9%
4-year native	54%

Full-time students transferring from 2-year public to 4-year public.
 Source: MDHE IFC Baseline Report 2007



Average time-to-graduate is greater for STEM transfers than both non-STEM and native STEM

Average Native Truman Time-to-Graduate	
STEM grad	Non-STEM
4.22	4.22

Average Transfer Truman Equivalent Time-to-Graduate	
STEM grad	Non-STEM
5.01	4.79

All data represent transcript analysis of US citizen students enrolled at Truman State University from 1998 to 2012. "Transfer" (N=2042) and "Native" (N=11,465) are as designated by Truman on transcripts. Equivalent Time-to-Graduate was determined by assuming that one academic year consists of 2 15-credit hour semesters.



**Junior science majors should have completed:
24-30 credits of Physical and Biological sciences and
5-22 credits of Calculus and Statistics.**

General Education (42-Hour Block)	MACC	MCC	SCC
Communication (Composition and Speech)	9	9	9
Humanities (Art, Drama, Foreign Language, History, Literature, Music, Philosophy)	6 + 3 (Literature)	9	9
Social and Behavioral Sciences (Anthropology, Economics, Geography, History, Political Science, Psychology, Sociology)	9	6 + 6 (Hist./Pol. Sci.)	9
Physical and Biological Sciences (Biology, Chemistry, Geology, Physical Geography, Meteorology, Physics)	9	9	7
Mathematics (College Algebra)	3	3	3-4
Additional General Education Requirements	3 (Computer)		3 (Multicult.) 1 (Capstone)
AA Requirements			
Additional AA Requirements	1 (Orientation)	3 (Computer)	
Electives	21	17	22



Many AS degrees currently only focus on pre-engineering and not other STEM disciplines

- Non-engineering STEM AS degrees may not overlap with typical 4-year STEM major plans
- Even with a well-thought out AS, transfer students take more STEM hours per semester in year 3 and 4 than native students.



Why are transfer STEM majors less successful than non-transfer STEM majors?

- 42-hour block and the AA do not prepare students for STEM transfer
 - Minimal STEM requirements in the AA
 - Lack of advanced mathematics
- Advising challenges
- Gatekeeper STEM course alignment
 - Equivalencies
 - Sequencing
 - Availability



Advising pre-STEM students in the community college is a challenge

- Identification of “pre-STEM” students does not occur in most cases
- Students either don’t get advising or don’t follow advising recommendations
- STEM faculty become informal advisors for select students
- Students do not read the catalogs of either institution
- Students need to be planning for transfer at matriculation (*i.e.*, already identified potential transfer institutions, know major course requirements and transfer equivalencies, etc.)



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Community College STEM Courses Do Not Align with STEM Major-Level Courses

Introductory Biology Courses Do Not Fulfill Freshman Biology Course Requirements at Five of Eleven Public 4-Years

Metropolitan CC	Truman	UM-Columbia	UM-Kansas City	UM- St. Louis	MO Southern	Missouri State	MO Western	NW Missouri St.	SE Missouri (Org., Eco., & Evol.)	U. of Central MO	Missouri S&T
BIOL 104: General Botany			✓	✓		✓		✓	✓	✓	
BIOL 106: General Zoology			✓	✓		✓	1 of 2	✓	✓	Fulfills SO req.	
Both courses taken		1 course			✓						



Courses need to be re-evaluated regularly

- Modern STEM courses are regularly changing
- When courses change, transfer staff and other institutions need to be notified
 - Labor intensive, need transfer staff
 - Requires communication by/between faculty
 - Examples:
 - Computer science courses were not listed as equivalent, but actually were
 - MACC “College Physics” (Calc-based) series counted as Truman’s “College Physics” (non-Calc) rather than “Physics with Calculus” series



Course sequencing and frequency of course offering make scheduling more difficult in STEM

- STEM courses often require a strict sequence of pre-requisites
- Advanced courses do not have enough demand and are costly to offer regularly
- Course scheduling can make it difficult to complete pre-requisites in a timely manner
- Faculty recommend students take an entire sequence (i.e. Phys I and II or Calc I, II and III) at the same institution



Sophomore STEM courses often not offered at CC or offered infrequently


Sem	Truman	SCC	MCC	MACC
1F	Gen Chem I	Gen Chem I	Gen Chem I	Gen Chem I
1S	Gen Chem II	Gen Chem II	Gen Chem II	Gen Chem II
2F	Org I + Quant	Org I + Quant	Org I (+ Lab)	Q + O on books but not taught
2S	Org II + Org I Lab	Org II + Org I Lab	Org II (+ Lab)	
3F	P Chem I + Org II Lab	P Chem I + Org II Lab	Quant	Org I + Quant
3S	P Chem II + Inst	P Chem II + Inst	P Chem II	Org II + Org I Lab
4F	Inorg Chem	Inorg Chem	P Chem I + Inorg	P Chem I + Org II Lab
4S	Biochem + Adv	Biochem + Adv	Biochem + Adv	P Chem II + Inst
5F				Inorg Chem
5S				Biochem + Adv

Resource intense course not often taught at CC

Quant allows smooth transfer

Quant in year 3 requires non-ideal sequence in 3/4

Students cannot graduate in fewer than 5 years total



High demand for initial STEM courses can prevent students from starting a sequence on time

- At most 4-year schools, seats in introductory STEM classes are reserved for first-time freshman
- Seats are also reserved in high-demand sophomore courses to help keep majors on track
- These options aren't possible at many CC's
 - Advising not geared toward STEM students
 - Students have not identified as "STEM"
 - Students enroll late
 - Course demand prevents "saving seats"



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Transfer Success in STEM Summit

November 14-15, 2013

Meeting of STEM faculty, advising and transfer staff, and administrators from the four partners

- Goal: Open lines of communication to discuss transfer in STEM disciplines

<http://step.truman.edu/visioninitiative/>

Publicly Available until March 1

After March 1, password: harrytruman



Conversations between and within schools are starting to lead to solutions

- Obvious equivalency problems addressed
- Course re-design is occurring
- AS degrees have been redesigned
- Advisors are changing how they work with STEM majors
- Potential course innovations and resource sharing are being considered
- Communication lines are staying open



IDEA: Statewide/Midwest meeting of STEM faculty and transfer staff

- Raise awareness of STEM transfer problems
- Discussions about:
 - Barriers
 - Possible solutions
 - Formation of multi-institution working groups



Small Group Discussions

Answers to questions can be recorded at:

<http://step.truman.edu/cota>
Select "Group Discussion Survey"



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