

TRANSFORMING MEDICAL EDUCATION WITH INNOVATIVE, INTEGRATED CURRICULA

Yen-Ping Kuo, PhD

**School of Osteopathic Medicine
Campbell University
United States of America**



高雄醫學大學

Kaohsiung Medical University



**SUBJECT FOCUS
SUMMIT**

MEDICINE

16-18 October 2017

PRESENTATION ROADMAP

INTRODUCTION:

- Osteopathic Medicine
- History of Curricular Integration

INTEGRATED CURRICULUM MODELS

EXPERIENCE & PERSPECTIVES

OSTEOPATHIC MEDICINE/ DO IN BRIEF

- Founded in the late 1800s by A. T. Still, MD.
- Osteopathic medicine emphasizes structure and function relationship, health promotion and disease prevention.
- DOs are trained to treat patients with all modern modalities AND with osteopathic manipulation, and are licensed to practice the full scope of medicine in all 50 states.
- Osteopathic medical schools, in general, place a stronger teaching emphasis on faculty.

COLLEGES OF OSTEOPATHIC MEDICINE IN THE US

Currently, Approximately 25% of the US medical students are training to be DOs.

ATSU-
SOMA, 2007

CUSOM,
2013

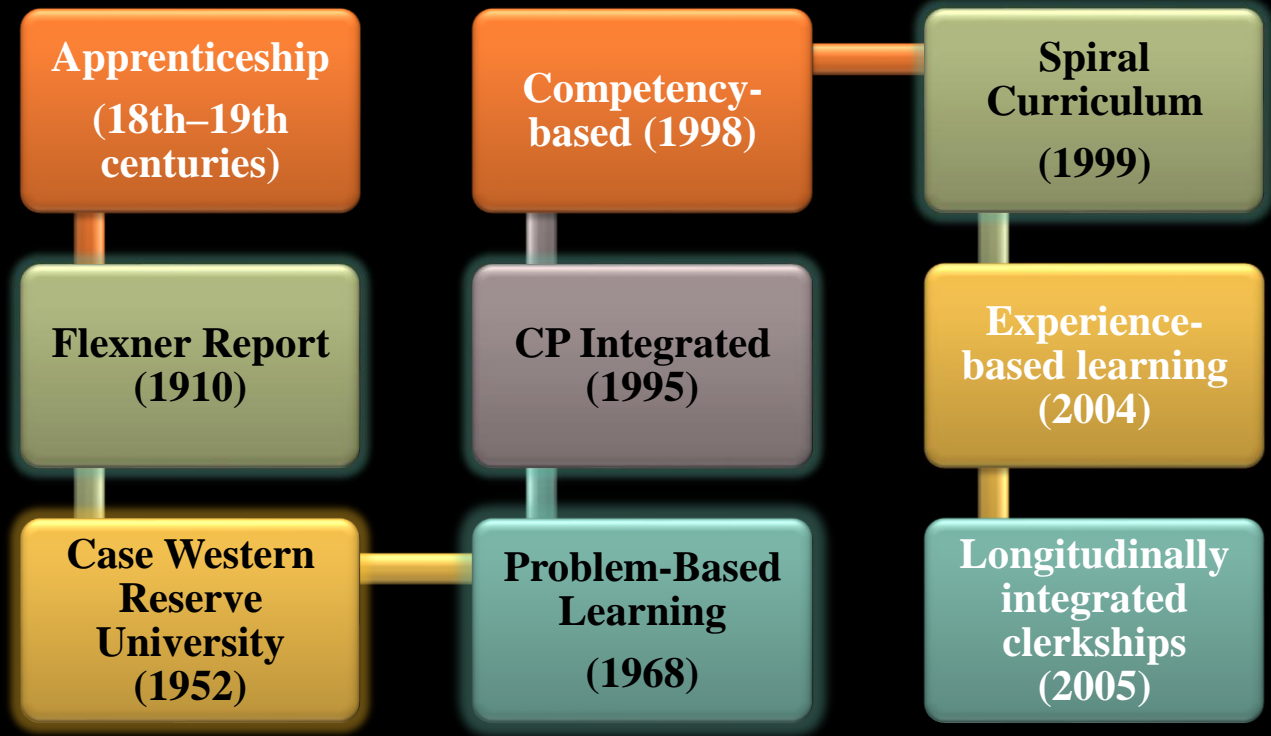


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<http://www.osteopathic.org/inside-aoa/about/aoa-annual-statistics/Pages/osteopathic-medical-schools.aspx>

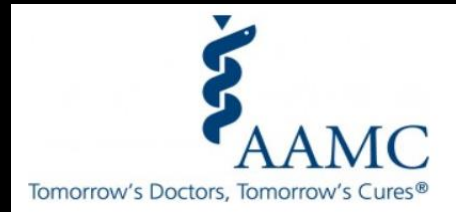
HISTORICAL DEVELOPMENTS OF MEDICAL EDUCATION CURRICULA



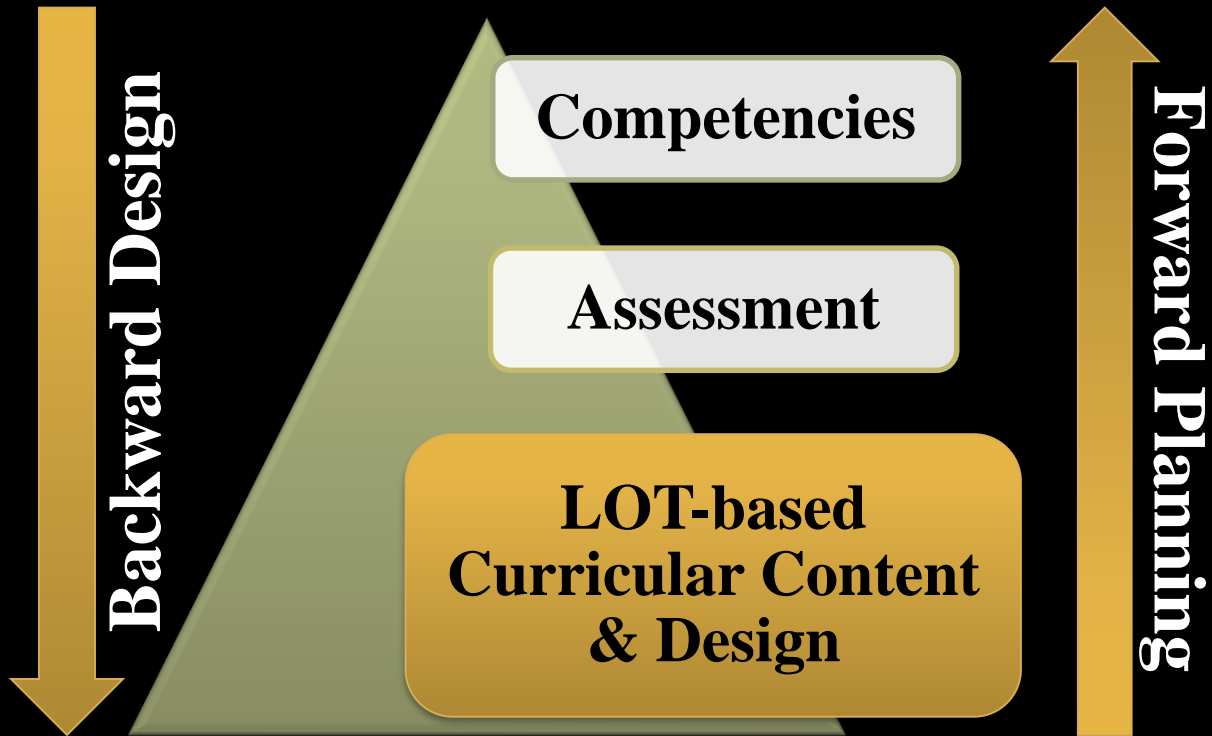
MOTIVATIONS BEHIND MODERN TRANSFORMATION

Education Psychology Theories

Requirements by Medical Education Organizations



PRINCIPLES OF MEDICAL EDUCATION INNOVATION



PRESENTATION ROADMAP

Integration of What? Integration is not automatic just because we teach them together.

INTRODUCTION:

- Osteopathic Medicine
- History of Curricular Integration

INTEGRATED CURRICULUM MODELS



THE CHARACTERISTICS OF AN INTEGRATED CURRICULUM



Break down barriers between the basic and clinical sciences



Promote acquisition, retention, and progressive development of knowledge and skills



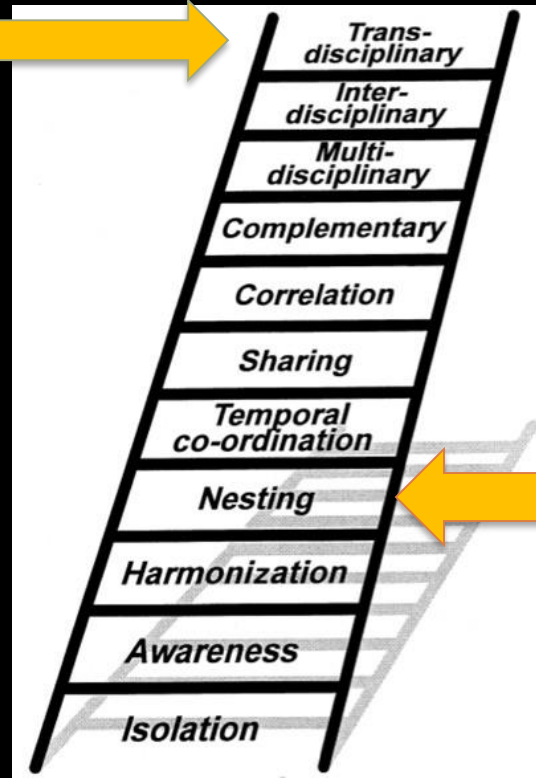
Facilitate applications of concepts

HOW MUCH INTEGRATION?

The Integration Ladder

- **Fusion**
- **Authentic integration**

(Harden, Medical Education, 2000)



HOW TO INTEGRATE?

Methods Of Integration

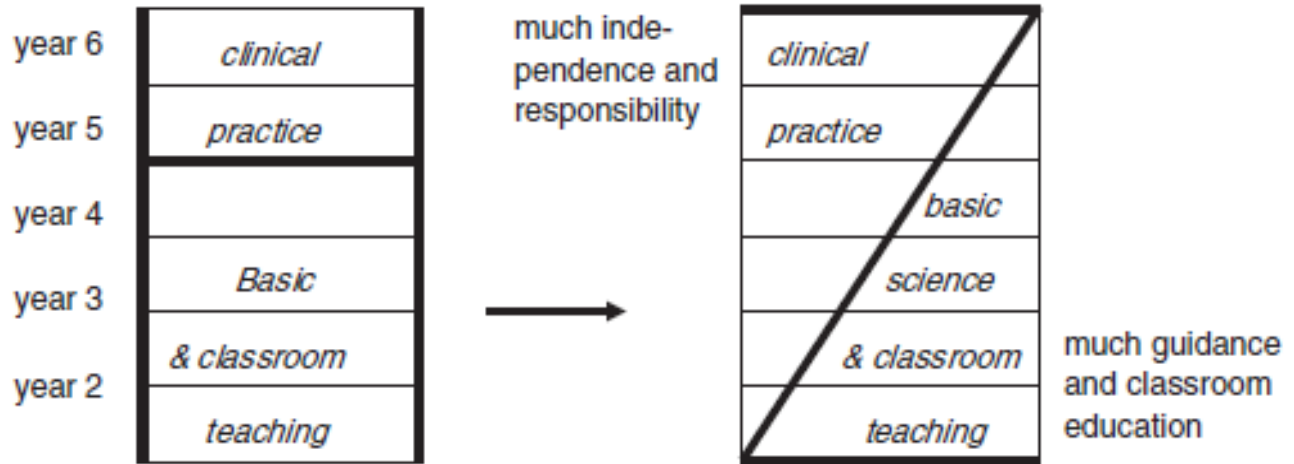
❑ Horizontal:

- integration across disciplines but within a finite period of time
- example: a combined year/semester-long, single basic science course

❑ Vertical/Z-Shape

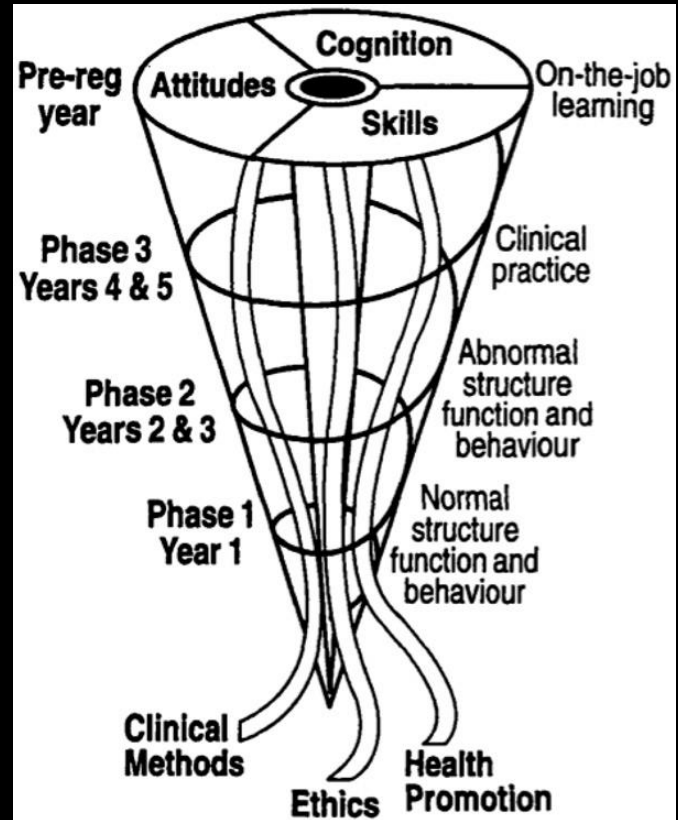
❑ Spiral

Z SHAPE VERTICAL INTEGRATION



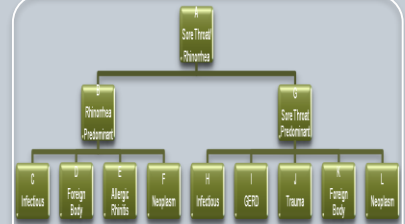
SPIRAL INTEGRATION

- Topics are revisited
- The topics visited are addressed in successive levels of difficulty.
- New learning is related to previous learning
- The learner's competence increases progressively until the final overall objectives are achieved.



INTEGRATED CURRICULUM MODELS

Problem-Based Learning Process



Problem-Based:

student-lead,
open-end
learning thru
problem
solving

Case-Based:

Teaching with
cases and with
predetermined
terminal
objectives

Clinical presentation:

Expert-guided
learning in an
inductive
clinical
framework

PRESENTATION ROADMAP

INTRODUCTION:

- Osteopathic Medicine
- History of Curricular Integration

INTEGRATED CURRICULUM MODELS

EXPERIENCE & PERSPECTIVES



A T Still University

School of osteopathic medicine at Arizona (ATSU-SOMA)

The first Clinical Presentation Curriculum in the US



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A CP CURRICULUM IN BRIEF

- **Principle:** ~120-125 the most common presenting signs or symptoms identified and their inductive reasoning schemes developed
- **Design:** Scientific concepts applicable in the decision-making process for the scheme are identified and presented **in the context of the scheme.**
- **Expected Outcome:** Enhances memory organization and improving diagnostic success.

Mandin, H., et al.
Academic Medicine, 1995
Medical Education 2000

ATSU-SOMA'S CP-BASED, INTEGRATED CURRICULUM (as 2013)

All CP Schemes are assigned to organ system courses in the first two years and then revisited during clerkship years.

7 WK	11 WK	11 WK	5WK	5WK	6WK
Biomed Sci	Neuro-MSK	Cardio-Pulmonary	Renal	Endo	GI
Anatomy, OMM, Clinical Skill					

9	3	4	6	3	4	4	5
Reprod/Urol	Sense	Human Dev	Hema-tology	Derm	Mind	Integra-tive	Board Prep
OMM, Clinical Skill							
EARLY CLINICAL IMMERSION IN CHC ACROSS THE US							

CP SCHEMES PRESENTED IN ATSU-SOMA NEURO SCIENCE COURSE

1

- **Headache**

2

- **Acute neurological deficits**

3

- **Seizure**

4

- **Altered Mental Status**

5

- **Dizziness, Numbness, Tingling**

6

- **Weakness**

7

- **Gait and Movement Disturbance**

Headache

Primary

Migraine

Non-migraine

Tension

Cluster

Other

Secondary

Endogenous

Exogenous

Intracranial

Other

Trauma

Substance

Infection

Vascular

Nonvascular

Cranial
Neuralgias

Psych

Other
Secondary

LEARNING ACTIVITIES WITHIN A CLINICAL SCHEME IN YEARS 1&2

Scheme Introduction



Disassemble the “Big Picture”



Re-assemble “Big Picture”

By Recapitulation, Case groups, Simulation

“HEADACHE” UNIT IN A GLANCE

	Monday 10/10		Tuesday 10/11	Wednesday 10/12	Thursday 10/13	Friday 10/14	
8:00 – 9:00	Course Introduction (Shadish/Pong)		Electrophysiology of Neurons (Pong/Sullivan)	Synaptic Transmission and Neurotransmitters (Pong/Kuo) (Kuo for 1.5 hrs)	OPP & Medical Skills	Pharm of Migraine Headache Medications (Wightkin)	
9:00 – 10:00	Headache Scheme Presentation (Pong)					Pathology of Secondary Headaches (Fischione)	
10:00 – 11:00	Gross Brain Anatomy (Anatomy, Wienke)		Brain/Neuronal Metabolism (Hansen)	Primary Headache Disorders (Root)		Microbiology of CNS Infections I (Kuo)	
11:00 – 12:00	Anatomy Brain Cytology (Anatomy, Hu)		Early Development of the Nervous System (embryology) (Fischione)	Secondary and Other Headache Disorders (Root)		Headache Scheme Wrap-Up	
12:00 – 1:00	Lunch		Lunch			Lunch	
1:00 – 2:00	Cultural Diversity (Ratto)	Anatomy (Slices, Hu)	Anatomy of Cranial Nerves (Anatomy, Olson)			Small Group	Anatomy (Cranial nerves, foramen)
2:00 – 3:00			CNS Imaging (Makin)				
3:00 – 4:00	Anatomy	Cultural Diversity (Ratto)				Anatomy	Small Group
4:00 – 5:00							

CP

NMSI

EXAMPLE OF SPIRAL INTEGRATION OF MICROBIOLOGY/ID in a CP CURRICULUM

LIMB PAIN

cellulitis, pyomyo
osteomyelitis: *S. aureus*

- normal microbiota sites; requirements; coagulase production; spreading factors; MRSA

joint infection: *S. aureus*
epidermidis

- differentiation via colony type, hemolysis pattern, fermentation, coagulase production; *S. epidermidis* slime production; device-related infections

FREQUENCY

prophylactic

microbiota sites;
colonization incl.
antibiotic resistance;
biofilms, slime layer

GI

NAUSEA AND VOMITING
food intoxication:

- S. aureus*
- superantigen enterotoxin

Basic
Characteristics

year 2

MACULAR SKIN RASH

TSS: *S. aureus*

- superantigen TSST-1

BLISTERS

folliculitis, furunculosis,
carbuncles, skin abscess,
impetigo, SSSS: *S. aureus*

- salt, temp., desiccation resistance; superantigen exfoliative toxins

Dermatology

BREAST DISORDERS

mastitis, breast abscess:

- S. aureus*, *S. epidermidis*
- review of pyogenic factors, MRSA

GU

EYE REDNESS

blepharitis, dacryocystitis,
orbital cellulitis,
conjunctivitis,
endophthalmitis: *S. aureus*, *S. epidermidis*

- review of normal microbiota sites, spreading factors

Senses

HOW WELL DID IT WORK?

-Student Perspectives-

- Academic Transition?
- Learning Motivation?
- Board Performance?
- Use of basic science knowledge in clinical reasoning?
- Transition/matching to residency?
- Challenging for Many
- Extremely high early
- Passing rate OK but “more” to be desired**
- SHINE
- “Star” students (who have the number AND skills) have huge edge

Perhaps, there additional selection factors that should be considered during admission process?

WHAT ARE NEEDED TO INCREASE THE SUCCESS IN A CPC?

-Educator/Institutional Considerations-

- **Involve the “right” ones**
 - Team-player trait is essential
 - Willingness to step out of PhD-MD-DO comfort zones
- **Heavy Faculty development**
 - Education theory
 - Teaching techniques/modality
- **Dedicated teaching and planning responsibility**
 - Content mapping/tracking required
 - Program-specific faculty appointment desired

STABILITY



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CUSOM

CUSOM'S HYBRID CURRICULUM

Year 1

SEMESTER 1

**Cell Bio& Biochem,
Micro & Immun**

**Physiology,
Pathology,
Pharmacology**

SEMESTER 2

**Musculoskeletal
System**

**Neurosensory
Psychiatry**

Anatomy, Clinical Skill, OMM, PCC, FMP

Year 2

SEMESTER 1

**Cardiovascular
System
Respiratory System**

**Hematology,
Dermatology,
Renal System**

SEMESTER 2

**Endocrine, GI
Systems**

**Reproductive
System
COMLEX I prep,
Introduction to
Clinical Clerkships**

Clinical Skill, OMM, PCC, FMP

Block 1 - Week 1 - 2017

Block Leaders: Dr. Kuo / Dr. Powers / Dr. Terreberry

Basic Science Horizontal Integration

Full Integration by Case Conference

Time	Monday, July 31, 2017	Tuesday, August 01, 2017	Wednesday, August 02, 2017	Thursday, August 03, 2017	Friday, August 04, 2017	Time
08:00 :00	Cell Biology/Biochemistry 01	Cell Biology/Biochemistry 01	Cell Biology/Biochemistry 01	Cell Biology/Biochemistry 01	Integrated Case 1	8:00
	Water, pH and Buffers	Cell Membrane	Transcription	Protein Trafficking and Degradation	7/31/17 - 8/2/17	
08:50 :30	Dr. Trione	Dr. Danielson	Dr. Luthia	Dr. Luthia	Study Techniques Development 1	8:30
09:00 :00	Cell Biology/Biochemistry 02	Cell Biology/Biochemistry 01	Cell Biology/Biochemistry 01	Cell Biology/Biochemistry 02	Clinical Skills Case 1	9:00
	Cell Structure			Gene Expression		9:30
09:50 :30	Dr. Danielson			Cell Biology/Biochemistry 03		
10:00 :00	Cell Biology/Biochemistry 03			Cell Biology/Biochemistry 03		
	Amino Acids and Peptides			Techniques in Medicine		10:30
10:50 :30	Dr. Luthia					
11:00 :00	Cell Biology/Biochemistry 04	OMM 01	Microbiology/Immunology 01	Cell Biology/Biochemistry 04	Clinical Case	
	Protein Structure	Osteopathic Principles & Tenets	Introduction to Medical Microbiology and Normal Microbiota	Myoglobin and Hemoglobin		11:30
11:50 :30	Dr. Luthia	Dr. Moryka	Dr. Kuo	Dr. Trione		
12:00 :00		Lunch		Microbiology/Immunology 02		12:00
				Introduction to Infectious Diseases		
12:50 :30				Dr. Kuo		12:30
13:00 :00		OMM Lab 1	ExamSoft Training			
	Anatomical Terminology					13:30
13:50 :30	Dr. Mitchell	Palpation, Landmarks, Sonastic Dysfunction	Review of ExamSoft and Mock Exam	Professional Etiquette		
14:00 :00				Dr. Mann		
14:50 :30	Empathy Survey Dr. Newton	Study Time EVENT TABLES		Clinical Skills Lab 1		
15:00 :00		GROUP A	GROUP B		Study Time / ExamSoft Questions to	
	ODD TABLES	ExamSoft Training	OMM Lab 1	Professional Etiquette	Study Time GROUP B	
15:50 :30						
16:00 :00	Study Time ODD TABLES	Review of ExamSoft and Mock Exam	Palpation and Principles Exercises	GROUP A	Clinical Skills Lab 1	
16:50 :30		Empathy Survey Dr. Newton		Study Time GROUP A	Professional Etiquette	
17:00 :00		EVENT TABLES	GROUP A	GROUP B		

Course Directors: Anthony Dr. Mitchell; Cell Biology/Biochemistry Dr. Trione; Clinical Skills Drs. Mann/Velazquez; PMP Drs. Brannan; Microbiology/Immunology Dr. Kuo; OMM Dr. Moryka; PCC Dr. Loree Payne & Mr. Short

Block 4 - Week 1 - 2017

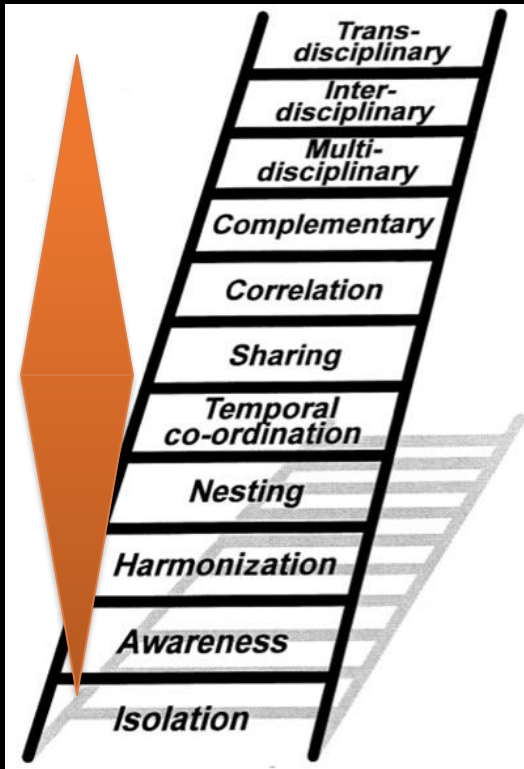
Block Leaders: Dr. Terreberry, Dr. Halm, Dr. Powers

Time	Monday, March 13, 2017	Tuesday, March 14, 2017	Wednesday, March 15, 2017	Thursday, March 16, 2017	Friday, March 17, 2017	Time
08:00 :00	Neuro 1	Psych 1	Neuro 7	Psych 3	Integrated Qult 1	08:00
	Common Neurological Presentations / Case 1	Common Psychiatric Presentations; Introduction to Psychiatry	Gross Brain II	Pediatric Psych I - Congenital and Developmental Disorders	3/13/17 -3/15/17	
08:50 :30	Dr. King, Thiele & Dr. Terreberry	Dr. S. Smith	Dr. Newton	Dr. Mann	FMP 1	08:30
09:00 :00	Neuro 2	Psych 2	Neuro 8	Psych 4	Foundations: Why read papers at all? Introduction to the P.I.C.O. method to evaluate journal articles	
	Embryology of the Nervous System			Diseases of Psychiatry I - Dementia	Dr. Fowler	09:30
09:50 :30	Dr. Mitchell				FMP 2	09:30
10:00 :00	Neuro 3			Psych 5	Assessing Methodological Quality	
	Developmental/Chromosomal Disorders			Diseases of Psychiatry II - Delirium	Dr. Brennan	10:30
10:50 :30	Dr. Mitchell				PCC 1	10:30
11:00 :00	Lunch			Lunch	Cultural Competency of LGBT Patients	
11:50 :30		Dr. Motyka	Dr. Bransel/Dr. Larson		Dr. Mahanty/ Mr. Guy Hammond	11:30
12:00 :00	Neuro 6	Lunch	Lunch	Neuro 11	PCC 2	11:30
	Gross Brain I			Pons	Informed Consent (SDI)	
12:50 :30	Dr. Newton			Dr. Newton	Dr. Oltman	12:30
13:00 :00	Neuro 5	OMM Lab 1		Neuro 12	Post Qult Review	
	Spinal Cord		Clinical Skills Lab 1	Midbrain	Review of Questions from last Qult	
13:50 :30	Dr. Newton	Cranial Nerves		Dr. Newton	Lunch	13:30
14:00 :00						
14:50 :30		GROUP B				
15:00 :00	Study Time	OMM Lab 1		Study Time	Study Time	
15:50 :30			Standardized Patient Exercise I			
16:00 :00		Study Time GROUP B				
16:50 :30		Cranial Nerves				
17:30 :00		GROUP A				17:30

Course Directors: Anatomy - Drs. Mitchell & Toler; Psychiatry - Dr. Tolentino; Clinical Skills - Drs. Mann & Halm; FMP - Drs. Brennan, Fowler, Powers; Neuroscience - Drs. Newton, Terreberry, & Hiskalman; OMM - Dr. Motyka; PCC - Drs. Mahanty & Lowe Payne

Week 1

SUMMARY OF CUSOM CURRICULUM IN THE INTEGRATION LADDER



- Primarily Z-shape
- Vertical integration in system-based courses
- Some degrees of horizontal integrations during first two blocks
- Simulation Medicine and Friday Case Conferences provide full integration experiences and with spiral integration into years 3&4.

HOW WELL HAS IT WORKED?

-Student Perspectives-

- Academic Transition?
- Learning Motivation?
- Board Performance?
- Use of basic science knowledge in clinical reasoning?
- Transition/matching to residency?
- Average
- Higher in System Courses and during Simulation
- SHINE**
- Gradual growth
- Shine; most likely due to high Board performance

CUSOM STUDENTS LICENSING EXAM PERFORMANCE

Last updated: 10/2/2017	COMLEX-USA Level 1			COMLEX-USA Level 2CE			COMLEX-USA Level 2PE		
Student Performance	Class of 2017	Class of 2018	Class of 2019	Class of 2017	Class of 2018	Class of 2019	Class of 2017	Class of 2018	Class of 2019
First-Time Pass Rate	92.95% (n=144/155)	92.76% (n=144/155)	98.72% (n=154/156)	98.69% (n=151/154)	95.95% (n=143/149)		96.80% (n=149/154)	98.00% (n=98/100)	
	(92.28% Nat'l Mean)	(92.68% Nat'l Mean)	(96.54% Nat'l Mean)	(93.20% Nat'l Mean)	(95.83% Nat'l Mean)	NA	(92.90% Nat'l Mean)	(Nat'l Mean NA)	NA
% Students above 600** on COMLEX	21.79% (n=35)	16.77% (n=26)	36.55% (n=53)	39.86% (n=60)	33.56% (n=50)	NA	NA	NA	NA

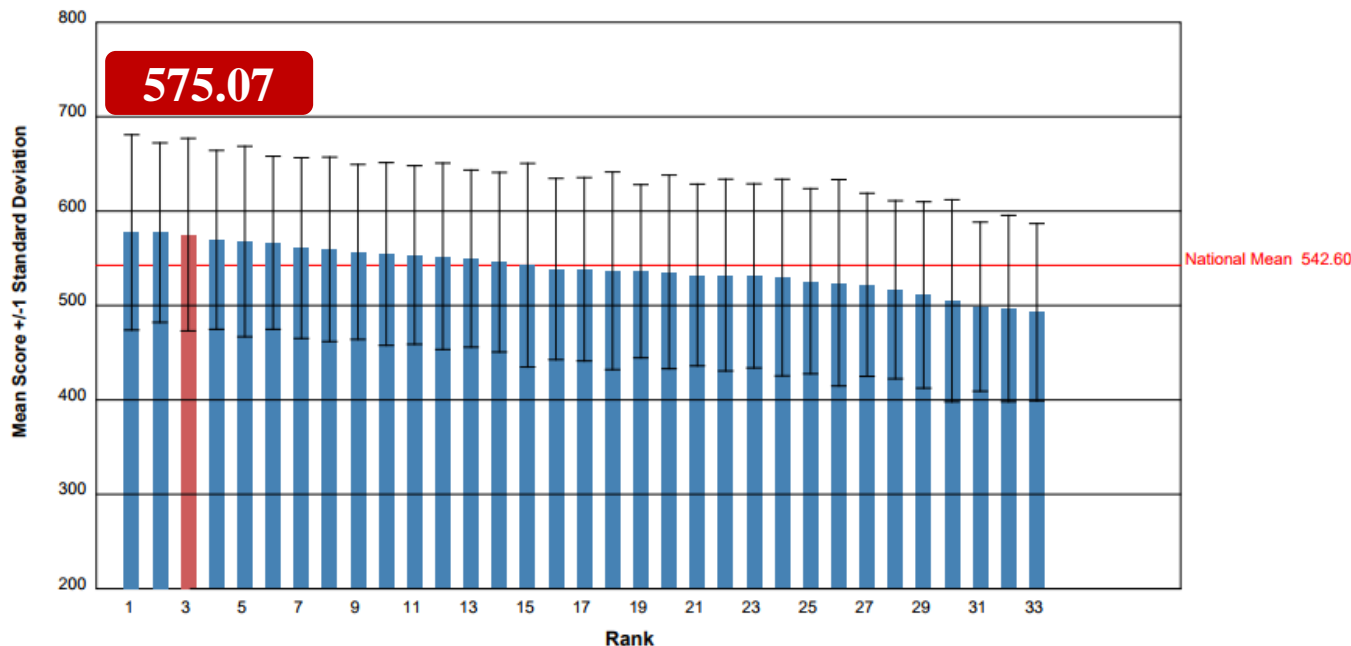
- Class of 2017 had mean discipline score for Level 1 ranking CUSOM #11 out of 48 COMs

COMPARATIVE PERFORMANCE OF SCHOOL MEAN SCORES ON COMLEX-USA LEVEL 2-CE

(June 2016 - May 2017 First-Time Takers Only)

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(The red bar represents your school's performance while the red line represents the national mean)



The red bar represents your school's annual performance. To meaningfully compare your school's annual performance to other schools, please take the standard deviation into account e.g., the line with upper and lower bars.

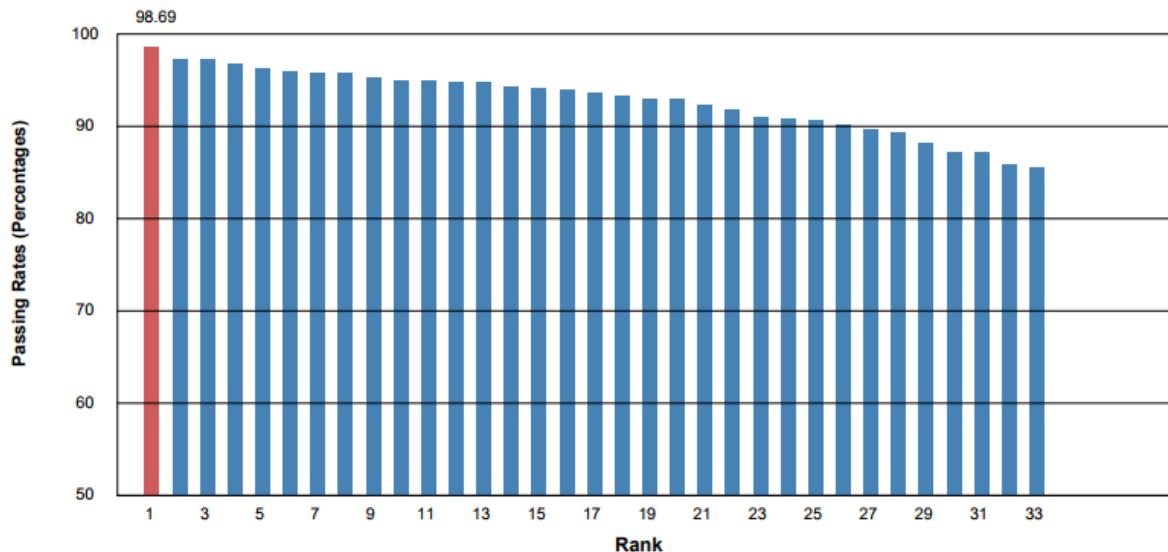
The mean score for your school is 575.07 and the standard deviation is 101.94.

COMPARATIVE PERFORMANCE OF SCHOOL PASSING RATES ON COMLEX-USA LEVEL 2-CE

(June 2016 - May 2017 First-Time Takers Only)

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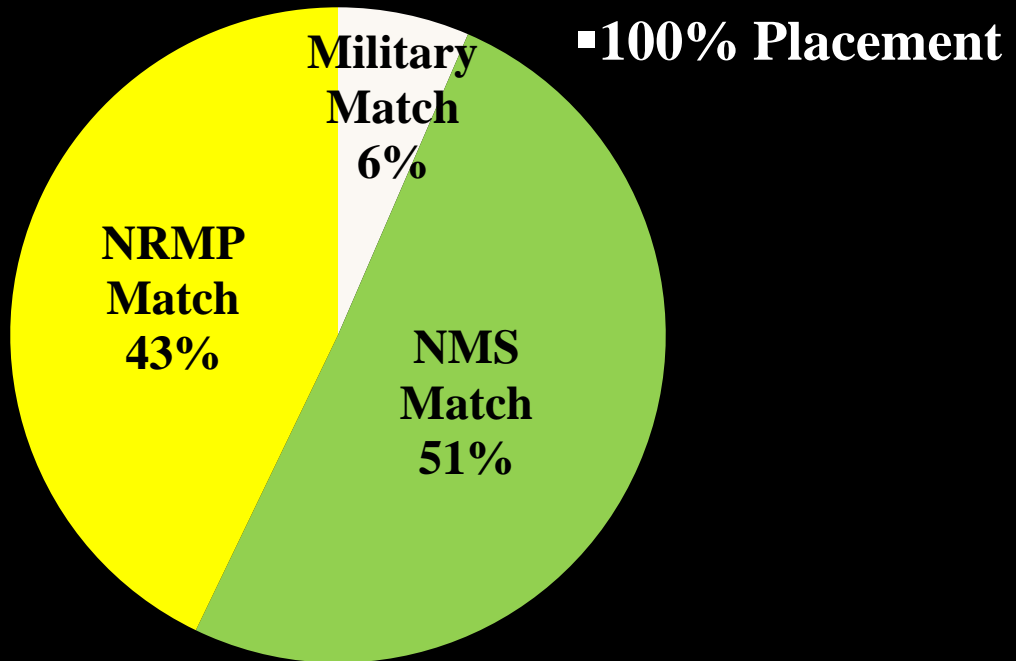
(The red bar represents your school's performance)



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CUSOM CLASS 2017 RESIDENCY MATCH



OPPORTUNITY FOR IMPROVEMENT?

-Educator/Institutional Perspectives-

- Map biomedical science into Years 3 and 4
- Blur basic science discipline boundaries
- Build spiral integration
- Increase interdisciplinary teaching/learning
- Convert lower-order to higher-order teaching/learning activities

THE FUTURE OF MEDICAL EDUCATION? CHALLENGES?

- ❑ In 2000, Harden “predict” the medical education for 2015: (Harden, R M. Medical Teacher, 2000)
 - Many have happened: ex. technology influenced, student-centered, outcome-based
 - Many are happening: adaptive curriculum, student-planned, community focused
- ❑ **Changing an existing curriculum is difficult, but....**
- ❑ **Innovation is easier by starting new, but....**

“Good business leaders create a vision, articulate the vision, passionately own the vision, and relentlessly drive it to completion.”

-John Francis "Jack" Welch-

Thank you!!