Case Western Reserve University School of Medicine and Cleveland Clinic

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Curriculum Management and Governance Structure

Case Western Reserve University (CWRU) School of Medicine (SOM) has two collaborative and innovative educational tracks: University track and College track.

- University-based program (University track) was established in 1843 and Cleveland Clinic-based Cleveland Clinic Lerner College of Medicine (College track) was established in 2002.
- University track implemented a major curriculum revision in 2006, focusing on development of lifelong learners and incorporating themes of scholarship, clinical mastery, leadership, and civic professionalism. A dedicated four-month research requirement culminating in an MD thesis was incorporated into the four-year curriculum. A hybrid of active, student-centered PBL groups and teacher-centered large and medium group sessions form the backbone of learning venues.
- Five-year competency-based College track is designed to train graduates with excellent clinical skills, expertise in research, and a passion for scientific inquiry. Students complete a master's level thesis and graduate with an MD degree with Special Qualification in Biomedical Research.
- While course format, assessment approaches, and curricular topics beyond core content of University and College tracks differ, clinical rotations for both tracks were designed collaboratively and implemented jointly.

Curriculum Management and Governance Structure

- SOM faculty Committee on Medical Education evaluates, reviews, and makes recommendations concerning overall goals and policies of medical education programs for University and College tracks.
- Curriculum Monitoring Council (University track) and Curriculum Steering Council (College track) have responsibility for (1) defining and allocating educational objectives, (2) approving teaching methods and instructional formats, (3) monitoring coordination and integration of curricular content, (4) selecting assessment methods to document student performance, (5) monitoring quality of teaching, (6) overseeing curricular and program outcomes.
- Basic science leadership groups for each track facilitate sharing of best educational practices among course leaders, design and implement programs to ensure basic science mastery, and facilitate smooth implementation of methods of student assessment.
- Joint Clinical Oversight Group (JCOG) monitors and evaluates clinical experiences at affiliated teaching hospitals of CWRU SOM. JCOG oversees curriculum design, program evaluation, educational quality, student assessment, and compliance with LCME and institutional requirements for the clinical curriculum.
- The Dean is chief academic officer responsible for both education tracks.
- The Dean delegates day-to-day responsibility for both tracks to the Vice Dean for Education and Academic Affairs. The Executive Dean for the College track reports to the Vice Dean for Education and Academic Affairs. The Executive Dean for the College track is also accountable to the Chief of Staff of the Cleveland Clinic with regard to Cleveland Clinic resources and support for the College track.

Curriculum Support Offices

- Offices of Curricular Affairs for each track include an associate dean for curricular affairs, MD and PhD educational leaders, and administrative staff who provide support for their respective educational programs. These offices support curriculum development and implementation, ongoing quality improvement, student assessment, and program evaluation. They work collaboratively with respective offices of information technology to develop, improve, and maintain extensive electronic curricula, student assessment resources, and program evaluation methodologies.
- Each track has a director of undergraduate clinical education, support staff, and physician and nonphysician educators to support components of clinical curriculum for each track and collaborate on the joint clinical program.
- Both tracks have robust faculty development programs to support teaching and implemented initiatives to encourage educational scholarship.

Year school was established: university track, 1843; the Cleveland Clinic-based Cleveland Clinic Lerner College of Medicine (college track) in 2002.
School URL: http://casemed.case.edu/.
University track: http://casemed.case.edu/admissions/education/up_program.cfm/.
College track: http://www.clevelandclinic.org/cclcm/.

Financial Management of Educational Programs

- When the Dean committed to revision of the University track's curriculum in 2004, a new curriculum budget was established to support University track curriculum development, implementation, ongoing program maintenance, and improvement.
- CWRU School of Medicine has affiliation agreements with its major teaching hospitals. As a part of affiliation agreements with three teaching hospitals, faculty are expected to contribute 100 hours annually to medical school teaching activities. University track established a faculty-teaching database that provides ongoing reports about faculty teaching effort to department chairs.
- All College track faculty are salaried employees of a central Cleveland Clinic budget, allowing Department Chairs to allocate release time for teaching and service activities.

Valuing Teaching

- Qualifications for faculty appointments include "a high level of teaching effectiveness," with documentation of quality and quantity of teaching activities within teaching portfolios.
- Nontenure track faculty appointments are based on an area of excellence: teaching, clinical service, or research.
- In addition to schoolwide and departmental teaching awards, faculty are invited annually to submit applications for Scholarship in Teaching awards. Applications are peer-reviewed, and each year 20–30 faculty are recognized by the Dean at the Annual Education Retreat.
- Cleveland Clinic faculty are recognized for teaching as part of annual performance reviews, which are used to determine promotion and salary decisions. College track maintains a database of faculty leadership and teaching activities for all components of the curriculum; summary information is provided to faculty members and chairs as part of the reviews.

Curriculum Renewal/Development Process

University Track Curriculum Development

- Major curriculum transformation, Western Reserve2 (WR2), launched July 2006.
- Key Objectives for Curriculum Development Process
  - Medical education will be experiential and emphasize skills for scholarship, critical thinking, and lifelong learning.
  - Educational methods will stimulate an active interchange of ideas among students and faculty.
  - Students will be immersed in a graduate school educational environment with flexibility and high expectations for independent study and self-directed learning.
  - Learning will be fostered by weaving scientific foundations of medicine and health with clinical experiences throughout the curriculum. These scientific foundations include basic science, clinical science, population-based science, and social and behavioral sciences.
  - Every student will have an in-depth mentored experience in research and scholarship.
  - Recognizing obligations of physicians to society, central themes of public health, civic professionalism, and leadership will be longitudinally woven throughout the curriculum.
  - Systems issues of patient safety, quality medical care, and health care delivery will be emphasized and integrated throughout the curriculum.
  - Students will acquire a core set of competencies in knowledge, mastery of clinical skills, and attitudes that are prerequisite to graduate medical education.

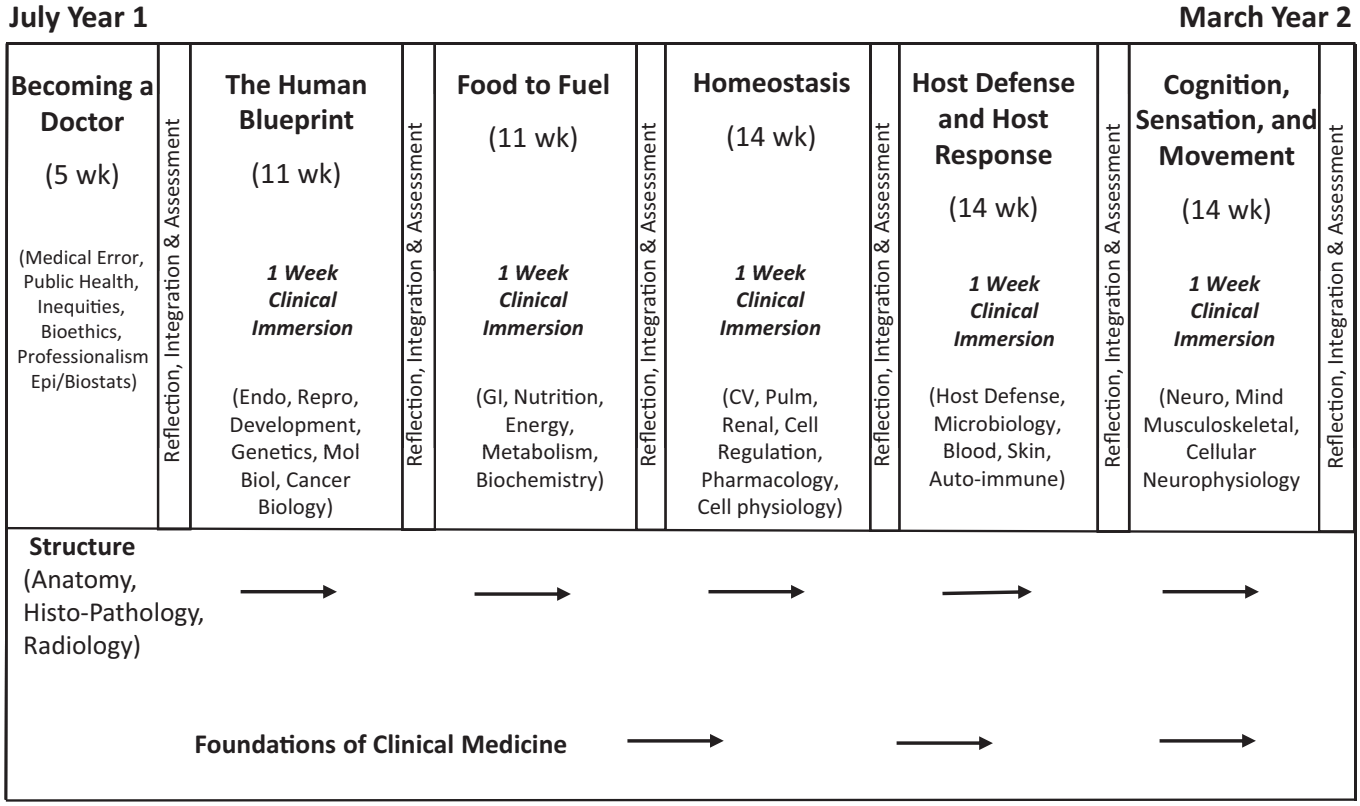
Learning Outcomes/Competencies

- WR2 Curriculum is based on nine core competencies with well-defined achievement levels for each that serve as educational objectives (medical knowledge, patient care, communication skills, professionalism, lifelong learning–personal development, research and scholarship, civic professionalism–health advocacy–leadership, problem-based learning and improvement, systems-based practice).

Components of the Curriculum Development Process

- Preclerkship basic science portion of WR2 curriculum is 20 months in length with six systems-based course blocks that integrate normal and abnormal content throughout (Chart 1).
- Weekly in-class basic science teaching is limited to 16 hours a week, paired with high expectations for self-directed learning outside the classroom.
- A wide range of dual-degree opportunities are available for students to pursue.
- One week of each block is dedicated to experiences in the clinical setting. During Clinical Immersion Weeks, students have opportunities to see how basic science concepts learned in the classroom translate to and impact on patient care.
- First block of the curriculum, five weeks in length, is "Becoming a Doctor." It introduces students to medical school education at the macrolevel with a focus on social and behavioral context of health and disease.
- Themes from the first block and additional content in Health Policy, Bioethics, Doctor–Patient relationship, and

CHART 1: University Track Basic Science Curriculum



sociobehavioral medicine are continued in weekly 2-hour seminars.

- Case Inquiry Groups (IQ groups), based on McMaster's revised PBL format, serve as a core teaching method for six of the formal teaching hours (three 2-hour sessions per week).
- Anatomy, histopathology, and radiology are integrated into a longitudinal "Structure" block.
- Learning from multiple sources is emphasized (including a rich array of web-based resources); previous extensive written syllabus was eliminated.
- Weekly Foundations of Clinical Medicine Seminars (Doctoring Course) integrates with IQ cases when appropriate.
- Sixteen-week mentored research experience with MD thesis is required for all students.

Components of the Assessment Process

- Goal of deep learning, synthesis, and information transfer expected in WR2 requires that assessment strategies align with curriculum objectives.
- CWRU SOM's longstanding pass-fail, criterion-referenced assessment system in the preclerkship curriculum was maintained.
- Weekly formative assessments include 20–30 multiple choice questions and 2 synthesis essay questions primarily based on content of the week; these are open book, and group work is encouraged.
- End of block basic science summative assessment is a 4- to 5-hour synthesis essay examination; each essay is vignette-based and incorporates multiple concepts and transfer of knowledge to new contexts.
- There is an end of block summative anatomy and histopathology examination with practical, short answer, and multiple choice portions.
- At the end of each block, students take a formative multiple choice test developed through the NBME customized assessment services. Each test has questions specific to current block of study as well as questions assessing material from previous blocks. This enables students to monitor their progress in studying for USMLE Step 1.
- At midpoint of each block, students engage in a personal quality improvement exercise by defining an area for improvement and developing a Professional Learning Plan of action.
- Students complete an end of year reflective portfolio to assess progress in nine core competencies.

- IQ group performance within areas of (1) contributions to group content and process, (2) skills of critical appraisal, and (3) professional behaviors are evaluated by IQ group faculty facilitators; students engage in peer assessment as well.
- Performance in preclerkship clinical curriculum is integrated into the overall assessment process and incorporates formative OSCEs, preceptor feedback, and student reflections.

New Topics in the Curriculum Since 2000

- Quality improvement and patient safety, longitudinal theme across four years
- Leadership and teamwork, evolving as longitudinal theme across four years
- Population health
- Increased emphasis on longitudinal development of communication skills, both preclerkship and clerkship components with opportunities for peer teaching in fourth year
- Health policy and health care economics

Changes in Pedagogy

- Student-centered problem-based learning groups (Case Inquiry Groups)
- No formal syllabus; rich electronic curriculum guides students to multiple sources for study
- Increased emphasis on self-directed learning
- Decrease in formal classroom time
- Selective videotaping of educational activities; 16 hours of core classroom time not videotaped
- Weekly formative assessment and integrative summative assessment
- Summative essay examinations focus on synthesis and integration of concepts
- Portfolios used to assess nine core competencies
- Increased emphasis on clinical context of basic science concepts through IQ cases and clinical immersion activities
- Developmental introduction of clinical reasoning skills and case presentations through IQ groups
- Integration and extension of basic science curriculum into core clinical clerkships

Program Evaluation

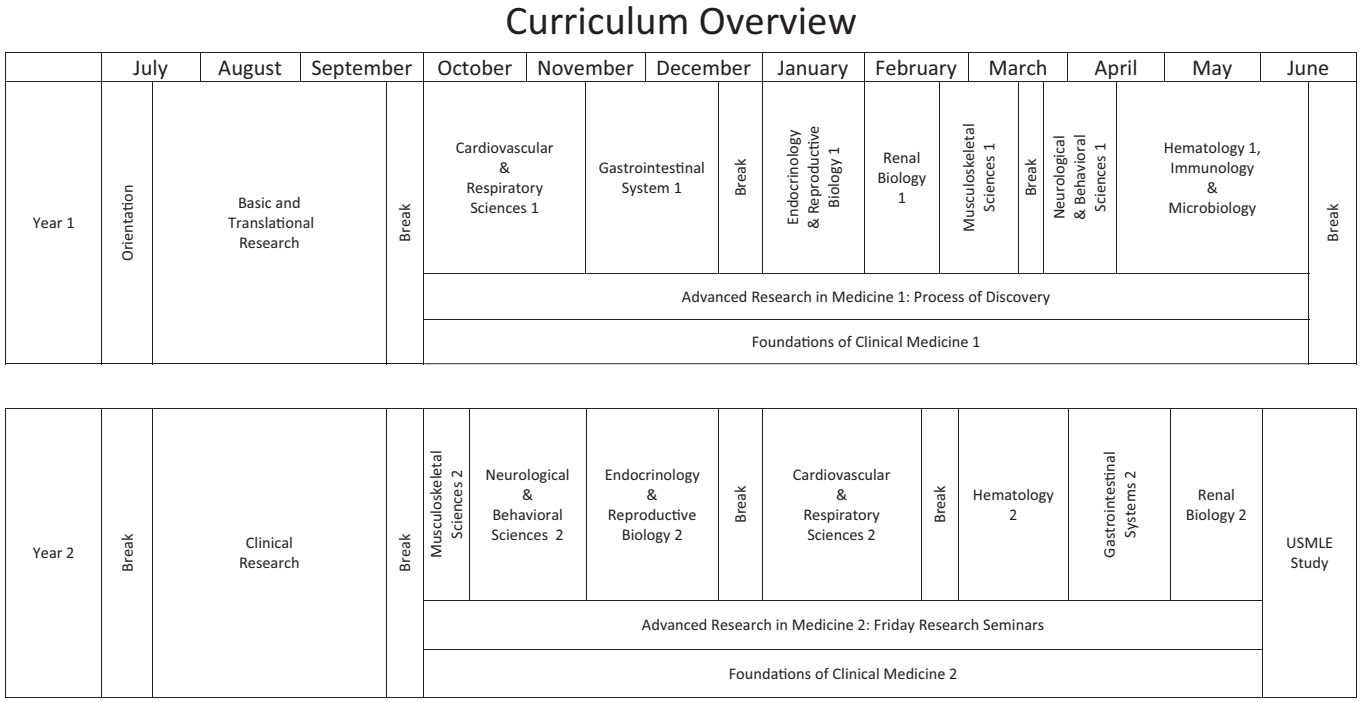
- Students complete online confidential surveys assessing their perceptions of course faculty, content and instructional methods, and learning resources.
- Curriculum committees, individual faculty instructors and course leaders, education leaders, and department chairs receive reports following each course or rotation.
- Curriculum effectiveness is assessed by tracking USMLE scores, residency program directors' perceptions, and graduation questionnaire responses. Scores on the Cognitive Behavior Survey, Attitudes toward Social Issues in Medicine, Learning Climate Inventory, Research and Scholarship Checklist, and Case Lifelong Learning Scale are also tracked.

College Track Curriculum Development

Components of Curriculum Development Process

- Affiliation agreement between Cleveland Clinic and CWRU in 2002 ensuring compliance with LCME strategies and appropriate oversight by CWRU.
- Mission to train physician investigators who will advance biomedical research and medical practice.
- *Series of faculty retreats*
  - *Identified outcomes for College track graduates*: independent thinkers, self-directed learners, team players, strong clinical skills, broad-based research skills, scientific inquisitiveness.
  - *Developed curricular principles that guided curriculum development*: provide a graduate school environment where students are responsible for their learning and seminars focus on application of knowledge; use active learning methods; research is major curriculum thread culminating in master's level thesis; students guided in personal and professional development of physicians and researchers by faculty dedicated to these activities; sufficient time and flexibility in curriculum to accommodate independent study and investigation; basic science, research, and clinical experience integrated into all years of the curriculum.
- All students participate in 9- to 10-week summer research experience in basic/translational research (year one) and clinical research (year two) in addition to two-year organ-based basic-science curriculum (Chart 2).
- Each week of the curriculum has a theme around which three 2-hour PBL sessions, 8 hours of seminars, and one hour of Advanced Research in Medicine seminars are organized.
- Foundations of Clinical Medicine seminars are held weekly.
- Thirteen Thread Leaders (representing sciences basic to medicine such as anatomy, physiology, ethics, epidemiology, and biostatistics) charged with responsibility to develop learning objectives for their discipline and work with organ-system course directors to determine best placement of these objectives in the curriculum. Curriculum Steering Council monitors implementation.

CHART 2: College Track Basic Science Curriculum



- Each student is assigned to a family medicine or internal medicine longitudinal preceptor during years one to two; students develop clinical skills with preceptors in every other week half-day sessions in year one and weekly sessions in year two; additional experiences include pediatrics, geriatrics, and acute care.
- Formal curriculum hours limited to 21 hours weekly; curriculum changes are time neutral to maintain flexibility for students.
- Opportunities available to earn master's degrees (Public Health, Engineering, Biomedical Investigation in Clinical Research, Nutrition, Pathology, or Biochemistry).
- Cleveland Clinic provides full tuition scholarships to all College track medical students to avoid significant financial debt at graduation and thereby facilitate entry into research careers.

Learning Outcomes/Competencies

- The curriculum is based on nine competencies; seven reflecting ACGME competencies (medical knowledge, clinical skills, clinical reasoning, communication, professionalism, health care systems, reflective practice) as well as research and personal development.
- Each competency has three to five specific standards for students to achieve by the end of years one, two, and five.

Components of the Assessment Process

- Goal of the College track assessment process is to help students become reflective practitioners of medicine complemented by a critical approach to self-assessment and self-improvement.
- Faculty developed assessment principles that require frequent, formative assessments to enhance student learning and engage students in ongoing cycles of self-assessment, supported by mentoring from physician advisors.
- Assessments align with the College track's nine competencies and developmentally appropriate standards; there are no grades or class rankings.
- Assessments are collected from multiple sources (faculty, peers, self) and multiple methods (OSCEs, faculty observations, MCQs) and contexts to provide students with frequent narrative formative feedback across the curriculum to identify strengths and areas needing improvement and document students' achievement of competency standards.
- In basic science courses, weekly CAPPS (concept appraisal essays) require students to integrate and apply knowledge to solve problems related to course material.
- All assessments collected in an ePortfolio for students and their advisors to reflect on and monitor progress longitudinally.

- Students use their assessment data to construct both formative and summative portfolios that document achievement of competency standards.
- Students' formative portfolios are reviewed with their advisors to develop learning plans; summative portfolios are reviewed by a Medical Student Promotion and Review Committee for promotion decisions.

New Topics in the Curriculum Since 2006

- Clinical reasoning in year two.
- Integrated program in medical humanities.
- Bioinformatics taught as a component of the Genetics Thread progressively over first two years.

Changes in Pedagogy

- Course directors have increased use of small group sessions (eight students per group) whenever possible to improve teacher–student and student–student interactions and increase student learning.
- Emphasis on faculty development to assist faculty in developing skills in small group, interactive teaching, and providing useful formative feedback.

Program Evaluation

- College track uses a systematic approach based on principles (collect only essential information, and so on) to determine fulfillment of institutional goals, identify curricular strengths and areas requiring improvement, and contribute to educational research.
- Student feedback is collected for all courses and track-specific innovations (portfolio-based assessment, research thesis, and so on) using multiple methods (debriefing meetings, web-based questionnaires, performance assessments, focus groups).
- Office of Curricular Affairs for College track summarizes evaluation evidence for each course into formal reports for course directors and related committees to identify curricular strengths and limitations.
- Course directors reflect on this information and prepare written reports for presentation to respective curriculum committees and approval by College track's curricular governance committee.
- Office of Curricular Affairs uses external, track-specific data (AAMC Matriculation and Graduation Questionnaires, USMLE reports) for bench-marking purposes.
- Since College track's inception, assessment and program evaluation data maintained in IRB-approved data registry to ensure ethical practices for program evaluation and educational research.

Clinical Experiences

- Clinical instruction and rotations for both tracks designed collaboratively and shared from third year onward.
- Four affiliated teaching hospitals: University Hospitals/Case Medical Center, Cleveland Clinic, MetroHealth Medical Center, Veterans Affairs Medical Center.
- Clinical rotations begin March of second year.
- *Required clinical rotations*: 40 weeks of basic core rotations, 8 weeks of advanced core rotations, and two subinternships
  - Three basic cores, each completed at one site
  - Basic Core 1 (medicine and surgery, 16 weeks)
  - Basic Core 2 (pediatrics, OB–Gyn, family medicine, 16 weeks)
  - Basic Core 3 (neuroscience and psychiatry, 8 weeks)
  - Two advanced cores
  - Aging and Society (4 weeks)
  - Undifferentiated and Emergent Care (4 weeks)
- Robust electronic Clinical Assessment System (CAS) combines patient logs with real time formative feedback and summative assessment in competency-based format.
- Track-specific curriculum one afternoon a week at students' home base
  - *University track*: IQ+ program to integrate reflection, basic science content, and advanced clinical skills into clerkships
  - *College track*: programs in advanced research skills and medical ethics and humanities
- *Challenges*
  - Achieving uniformity in student assessment across broad base of faculty
  - Students' desire for more formative assessments from faculty; challenging to encourage busy faculty to provide more frequent written narratives
  - Supporting clinicians' time for teaching
  - Moving faculty and students to consider new models for clinical education

Highlights of University Track

- High expectations for active, student-centered learning
- Case Inquiry Groups: new PBL variant with shorter, more focused cases
- Clinical immersion weeks embedded within basic science blocks
- Integrative essays to assess basic science knowledge

- Sixteen-week research and scholarship requirement with MD thesis
- Integration of SNAPPS case presentations across four-year curriculum to enhance expression and strengthening of clinical reasoning
- Portfolio assessment of competencies
- Integration of basic science into core clerkships through weekly IQ+ program

Highlights of College Track

- Small class size promotes collaborative learning environments, interactive teaching methods, collegial relationships with faculty
- Five-year integrated research curriculum and required master's level thesis
- Reliance on formative assessments to document student achievement of competencies; no grades, no class ranking
- Portfolio approach for competency-based assessment system
- Institutional commitment to faculty development for teaching and assessment roles and full tuition scholarships for all College track students
- Comprehensive program evaluation activities

Highlights of Shared Clinical Curriculum

- Clinical Assessment System featuring continuous formative assessment
- Clerkship groupings in 8- to 16-week integrated blocks
- Advanced cores introduce new, innovative curricular content
- Dedicated curriculum time during clerkships for program-specific educational goals