



Basic  
Science

Research

Clinical  
Medicine

Cleveland Clinic Lerner College of Medicine  
of  
Case Western Reserve University

# Overview of the Five-Year Curriculum and Assessment

*Fostering a passion for scientific inquiry,  
skills for critical thinking, and clinical expertise*

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of  
Case Western Reserve University**

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Case Western Reserve University**

***Overview of the Five-Year Curriculum***

**Introduction**

Cleveland Clinic Lerner College of Medicine of CWRU (CCLCM or the College Program) is one of three distinct programs leading to the MD degree in the Case Western Reserve University (CWRU) School of Medicine. CCLCM builds on the strengths of two leading academic institutions in Cleveland – Cleveland Clinic, which is one of the top five hospitals in the United States<sup>1</sup> with a history of excellence in clinical care of patients, training health professionals, and research, and CWRU School of Medicine, ranked in the top tier among US medical schools for NIH funding and its educational programs<sup>2</sup>. In 2002, Cleveland Clinic and CWRU formed an historic partnership to collaborate in education and research through creation of the CCLCM with support of a transformational donation from Al and Norma Lerner. As stated in the affiliation agreement between the two institutions, “the principal purpose and educational mission of the College shall be to attract and educate, in specially designed programs, a limited number of highly qualified persons who seek to become physician investigators and scientists who will advance biomedical research and practice.” ***Every aspect of CCLCM – from admissions criteria and goals for financial aid to curriculum structure, student assessment, student advising, curricular evaluation, the learning environment, and faculty development programs – has been specifically designed to create the physician investigators of tomorrow.*** Our goals are to select students with a desire to pursue careers as physicians and researchers, to educate them to be excellent doctors, to nurture their curiosity about science and medicine, to provide them with substantive research experience and core research skills, and to offer financial support to ensure that excess debt does not preclude their ability to follow careers in research and medicine.

**Training the Physician Investigators of Tomorrow: A Synopsis of the Program**

*Curricular Philosophy*

Recognizing the critical shortage of physicians engaged in research, our faculty created an educational program that provides medical students with the necessary skills and knowledge to enter academic residencies and pursue successful careers as expert doctors and basic, translational or clinical investigators – without requiring them to complete an advanced degree in addition to the MD. We expect our graduates to be scientifically inquisitive, to be life-long learners, to be independent thinkers with excellent teamwork skills, to have broad-based research knowledge and skills as well as strong clinical acumen, and to be reflective practitioners of medicine and science who take a critical approach to self-assessment and self-improvement. All three components of the curriculum – basic science, clinical and research (Figure 1) – in addition to the advising and assessment processes have been created to support the development of these attributes in our medical students.

1. <https://health.usnews.com/health-care/best-hospitals/articles/best-hospitals-honor-roll-and-overview>
2. <https://www.usnews.com/best-graduate-schools/top-medical-schools/research-rankings>

### *Basic Science Curriculum*

The **basic science curriculum** begins in the first summer with a core curriculum (Foundations in Molecular Medicine) in basic biochemistry, cell biology, molecular biology and bioinformatics (Figure 2b) which is taught using interactive small group problem-solving sessions. It then progresses to the organ-system blocks which apply adult learning principles in a graduate education setting, building on problem-based learning (PBL) to create an early link between clinical problems and basic science learning and to help students develop their skills in hypothesis generation, self-identification of learning objectives, oral presentation and teamwork. Almost all faculty-student contact time involves some form of active learning – graduate school-style seminars and problem sets requiring student preparation rather than lectures, case-based interactive anatomy sessions using fresh tissue dissections, imaging, virtual reality, computer-based applications, and simulations rather than demonstrations, and journal clubs. To support this educational model, curriculum schedules provide extensive time for independent study (Figure 2a). The basic science curriculum is organ-system based, with the disciplines of anatomy/embryology, biostatistics/epidemiology, cell biology, histology, imaging, immunology, nutrition, pathology, pharmacology, physiology, microbiology and infectious disease, oncology, genetics, bioinformatics, evidence-based medicine, health care systems, and ethics and humanities designated as curricular threads woven through every organ-system-based basic science course. Learning objectives for the basic science disciplines were used to determine the organ system curriculum structure in the first two years, with the goal of providing a logical, coherent two-year curriculum in each of the threads basic to medicine. Courses in Year 1 focus on normal human structure and function; in Year 2, courses focus on pathophysiology of disease. Later, in Years 3 through 5, students revisit advanced basic science concepts in their core clinical rotations, clinical electives, and CCLCM-specific sessions on Friday afternoons.

### *Clinical Curriculum*

The **clinical curriculum** begins at the same time as the first basic science course in Year 1. At its foundation is a continuity teaching and learning experience with a primary care preceptor and his/her patients throughout the first two years. Students spend one half-day every other week in Year 1 and one half-day every week in Year 2 with the same Internal Medicine or Family Practice preceptor. During Year 1, students learn core clinical skills in doctor-patient communications and physical diagnosis in sessions linked to the basic science courses (e.g., learning the cardiac and lung exams during the Cardiovascular and Respiratory Sciences course) and then hone these skills with real patients in their preceptors' offices on alternate weeks. Once they have mastered the basics of the history and physical, they begin to apply their skills to more complete evaluations of ambulatory adult, pediatric, and geriatric patients with direct observation and feedback from their preceptors.

In Year 2, students spend a half-day every week with their preceptor and a second half-day each week in sessions focused on building advanced clinical skills or clinical activities designed to complement concomitant basic science systems topics (e.g., a rotation in heart failure clinic lab during the week devoted to learning about heart failure). By the end of Year 2, students are capable of performing a complete history and physical and confidently evaluating adults with common outpatient problems and are well prepared to start required clinical rotations. The other key component of the clinical curriculum in Years 1 and 2 is the weekly Art and Practice of Medicine seminar series. This course focuses on principles of professionalism and ethics and their application to medical practice, the role of humanities in medicine, and an understanding of health care

systems, thereby providing a setting for students to reflect on their experiences and observations of the health care system. In Year 3, all 32 CCLCM students participate in the Cleveland Clinic Longitudinal Clerkship (CCLC) with 40 students from the CWRU's University Program. The CCLC consists of 4 blocks of 12 weeks each. One of these is a Longitudinal Ambulatory Block where students spend 12 weeks with the same preceptor in outpatient clinics in family medicine, internal medicine, pediatrics and women's health for a true longitudinal experience. Friday afternoon sessions in Years 3-5 bring CCLCM students together regardless of clinical or research location and focus on CCLCM-specific topics in research, human values, and professional development as physicians and researchers.

### *Research Curriculum*

The **research curriculum** begins on the first day of medical school with the basic and translational research block and extends throughout all five years of the CCLCM (Figure 1). Every student participates actively in a "bench" project in the first summer, and develops a mock research proposal that extends the summer research project to the next research question. At the end of the summer, students formally present their research project and findings to students and preceptors describing the project in the format used at most scientific meetings. In addition, students learn the basic principles of research design and data analysis and critical appraisal and interpretation of the basic science research literature in a journal club. Each student reads and interprets a research article related to the topic of the week working with a faculty content expert. The student summarizes key points of the article and presents a critique followed by an open discussion with the other students and faculty in the group. The goals of the journal club are to increase understanding in a specific area of research linked to the basic science curriculum, provide students with the skills to critically review the literature, and to present literature in an organized and thoughtful way.

The second summer is devoted to clinical research. Course work focuses on applied medical biostatistics and clinical epidemiology including appropriate design and analysis of various kinds of clinical research protocols (Figure 2b). Each student participates actively in an ongoing clinical research project and designs an original clinical research protocol to extend the summer research project to the next research question, prepares an oral presentation describing the proposed research protocol, and formally presents this proposal at the end of the summer. Each student also presents a research article in the Year 2 clinical research journal club in a process similar to the basic science journal club in Year 1.

During the remainder of Years 1 and 2, students participate in Advanced Research in Medicine (ARM), a weekly series of highly interactive research seminars linked to the content of the basic science courses. In Year 1, ARM is designed to provide students opportunities to interact with a wide range of successful investigators to help them understand the sequence of hypotheses, experiments, links to prior studies or other fields of investigation, serendipities, successes and failures that lead to new research findings primarily in the basic sciences. ARM 1 also helps students appreciate the interaction between basic and clinical research – how basic science discoveries translate into changes in the clinical care of patients and how clinical observations or research findings result in new directions in basic science research. In ARM 2, students participate in presentations that are linked to the basic science content each week but are more focused on current basic and clinical research projects, and the development of critical thinking skills. In ARM 3 during the third year, seminars build on prior knowledge and skills

in ARM 1, summer research science courses, and ARM 2 to offer students opportunities to study in more depth tools necessary for success in conducting research. Faculty facilitators present advances topics under themes of communication, methodology, innovation, and ethics. The goal of the ARM 4/5 “Hot Topics in Research” series is to provide students with information on novel topics, involving innovations resulting from interaction of clinical investigation and basic science research. Students are invited to meet some of the impressive clinical, translational, and basic scientists from the Cleveland Clinic community, who will offer a peek, beyond the immediate horizon, of what may affect medical practice in the future.

By the end of Year 2, each student has experienced basic and clinical research first-hand, has met a large number of investigators with different research interests, has developed essential research skills, and is ready to choose an advisor to supervise and support his/her research project with the guidance of his/her research advisor. After approval by the Research Education Committee, a Thesis Committee made up of the project advisor and two or more additional faculty supervises and approves the student’s research proposal and monitors progress of the research. Students complete their research projects in one 12- to 15-month block of time in Year 4 of the curriculum. Every student will continue to engage in clinical experiences at least one half-day per week during his/her research year – to ensure that students maintain clinical skills and contact with patients, develop a deeper appreciation of the connection between advances in biomedical research and patient care, and have the opportunity to reflect on their ongoing development as *both physicians and researchers*. *A final master’s level thesis must be defended within three months of completing the Research Thesis block and no later than mid-December of Year 5. The final revised thesis and signed paperwork is due no later than two weeks after the defense.*

Throughout all five years of medical school, research topics are integrated with basic science and clinical content. Learning objectives for PBL cases in the basic science courses include identifying the latest advances in what is known about the basic science underlying a specific disease, with students encouraged by their facilitators to think about how they could go about finding answers to relevant questions. Some of the core basic science concepts are learned from studying journal articles rather than textbooks, so students appreciate the research that led to current accepted basic science knowledge. Evidence-based medical practice is emphasized in the clinical curriculum and students are expected to identify clinical questions for which the evidence is lacking and think about ways in which to obtain it.

Many US medical schools require students to complete a scholarly or research project or thesis for graduation, and there is evidence that participation in some kind of research in medical school is a predictor of pursuing a career in academic medicine. Combined MD-PhD training programs have been successful in creating academic physicians, but the course of study extends over 7 to 9 years, and the majority of those graduates pursue basic science rather than clinical or translational research. By creating a medical school program that *not only* requires a substantive research project and master’s level thesis, *but also* incorporates a comprehensive integrated curriculum in research, we provide our students with an environment that fuels their enthusiasm for scientific inquiry and the practical research skills that will prepare them for successful careers as physician investigators.

### *Assessment*

CCLCM uses a unique approach to **student assessment** designed to enhance student learning and to promote self-directed learning. There are no grades for any course or rotation and no class ranking. Instead, each student is expected to attain a defined milestones of achievement in each of nine competencies. CCLCM's defined competencies encompass the six core competencies defined for all US residency programs by the ACGME (Accreditation Council for Graduate Medical Education) as well as research, personal and professional development, and teamwork and interprofessional collaboration. Starting on the first day of medical school, students begin collecting evidence of their progress in each of the nine competencies and reflecting on how the evidence demonstrates their development as doctors and researchers – the two interrelated professional roles for which they are preparing.

We recognize that assessment drives learning – but that a curriculum designed to foster self-directed learning and achievement of competencies will be ineffective if assessment focuses on what the “teacher” said in class and factual recall. We have therefore chosen a student-centered, student-driven approach to assessment with strong support from faculty members (the physician advisors) who know the students well and guide them as they develop skills and self-confidence as self-directed learners. Each physician advisor works with a limited number of students and follows those same students throughout all five years of the program.

Students gather a broad range of types of evidence over their five years of study and work as partners with their physician advisors to review the evidence and their reflections, to create individual learning plans to address areas of relative weakness, and to tailor their learning experiences to build on their areas of particular strength. Evidence of achievement and reflections on progress in their professional development are collected in electronic Student Portfolios and used to document readiness for promotion within and graduation from the program. By training our students in accurate self-assessment and helping them develop their reflective ability, we intend to prepare them for the kind of independent, self-directed learning habits that will be required of them as residents and throughout the rest of their professional lives.

### *Mentoring and Advising*

Our faculty identified close **mentoring and advising** relationships as critical in their own career development and designed the advising system to help ensure that students have multiple opportunities to develop such relationships. At the beginning of medical school, each student is assigned a physician advisor who serves as the student's coach in navigating and mastering the curriculum throughout all five years.

In addition, entering CCLCM students are assigned a research advisor who serves as a resource for students to guide them in choosing research experiences including choice of Year 2 summer research preceptor, thesis project, etc. The research advisor follows a student's research from a distance but is available for advice and guidance.



## **Curriculum Timeline: Years 1 and 2**

### Year 1 Summer Research

- First Week of Orientation
  - Welcome to the Profession
  - Meet with Summer Research Preceptor
  - Meet with Physician Advisor
  - Introduction to Summer Curriculum
  - Introduction to Assessment system and ePortfolio
  - CCLCM laptop, orientation to Information technology
  - White Coat ceremony with University Program Students
  - § Introduction to Dual Degree
- 10 weeks Translational Research Block
  - Foundations of Molecular Medicine
    - § Cell biology, molecular biology, biochemistry, bioinformatics
    - § Theme of the week with detailed learning objectives
    - § Small group interactive problem-solving sessions (PSS) M, W, T
    - § 2-hour focus topic seminars on Tuesday AM
    - § Friday journal clubs
  - Research Curriculum
    - § Hands on experience in lab of summer research preceptor
    - § Work on defined project + lab meetings, and other lab activities
    - § Develop mock research proposal due week 9
    - § Oral presentation on summer research project week 10
  - Self-care and Wellness curriculum
    - § 2-hour sessions on several Mondays

- Meeting with physician advisors

§ Review evidence in ePortfolio (feedback from peers and faculty)

- Problem-solving sessions
- Journal Club
- Lab work
- Mock grant proposal
- Oral presentation

§ Reflection on their professional development

§ Develop learning plans

- First formative portfolio
  - Due at end of 10 week block

#### Year 1 Organ-System Blocks

- Basic Science courses organized in organ-system blocks e.g. Cardiovascular and Respiratory (7 weeks), Gastroenterology (4.5 weeks), Endocrinology and Reproductive (4 weeks), Renal (3 weeks), Musculoskeletal (3 weeks), Neurosciences (5 weeks), Hematology, Immunology, Microbiology (7 weeks) with interwoven threads (e.g. Anatomy, embryology, physiology, histology, genetics etc.).

- Theme of the week

- Provides a framework for all sessions and threads

§ Humanities, ethics and health care systems

§ Communication skills

§ Physical diagnosis

- Problem based learning sessions

- 8 students with 1 faculty preceptor
- 2-hour sessions on MWF in the AM
- Collaboratively develop learning objectives and teach each other while solving a clinical case over one week.

- Anatomy, imaging and embryology
  - Case Directed Anatomy Sessions on Monday AM
    - § Presentation of surgical anatomy using clinical case
    - § Fresh cadaver prosections
    - § Virtual dissection using Sectra Tables
    - § Virtual Anatomy using Virtual Reality, mobile apps
    - § Ultrasound simulations
  - Online self-directed learning

- Histology
  - Virtual microscopy
  - Seminars

- Advanced Research in Medicine (ARM 1)
  - Friday PM
  - Interactive discussions with accomplished investigators
  - Topics linked to organ-system curriculum
  - Relationship between basic and clinical research

- Foundations of Clinical Medicine (FCM 1)

All sessions are coordinated with the content of the Organ-System curriculum

- Clinical Skills Training
  - § One ½ day every other week (Tue PM)
  - § Communication skills and Physical Diagnosis (total ~ 3.5 hours)
  - § Learn skills with standardized patients in small groups
- Longitudinal Clinic
  - § One ½ day every other week with Internal medicine or family medicine primary care preceptor – longitudinal ambulatory clinic
  - § Practice clinical skills with real patients – one on one with faculty preceptor

- Objective Structured Standardized Examination (OSCE)

- § At end of year 1

- § Feedback on mastering core clinical skills

- Art and Practice of Medicine (APM 1)

- § 2-hour interactive seminars on Tue AM covering topics in:

- Professionalism and Professional Identity Formation
    - Humanities in medicine
    - Ethics
    - Health care systems

- § Longitudinal qualitative investigation in the community with a presentation at the end of Year 1 (Devising Healthy Communities)

- Summative Portfolio

- Due at end of Year 1

Year 2 Summer Research

- 9-week Clinical Research Block

- Clinical Research Curriculum

- § Work with preceptor in active clinical research project

- § A mock clinical research proposal

- § Journal Club every Friday – application of knowledge gained from Biostatistics and epidemiology course to clinical research literature

- Medical Biostatistics and Clinical Epidemiology Course

- 2 hours each day

- § Formulation of scientific questions

- § Study design

- § Conducting clinical trials

- § Using statistical software to analyze real data sets

- § Legal and ethical issues in research

- Year 2 Organ-System Courses
  - Organized similar to Year 1 organ-system courses – Musculoskeletal (2 weeks), Neurosciences (3 weeks), Behavioral Sciences (3 weeks), Endocrinology and Reproductive Biology (4.5 weeks), Gastrointestinal (4 weeks) and Renal (3 weeks) with interwoven content from Immunology, pathology, oncology, infectious diseases/microbiology and biostatistics and epidemiology threads.
  - The key differences from year 1 are:
    - § Anatomy and embryology sessions are less frequent
    - § The Longitudinal clinic is ½ day every week (instead of every other week)
    - § Addition of clinical experiences in geriatrics, pediatrics, women's health, urology and acute care settings.
    - § Clinical correlation sessions to enhance learning by application of content covered during the seminars and PBLs
    - § There are 2 OSCEs – one at the beginning of the year to identify skills to address over the year and one at the end of Year 2 to document skills for the ePortfolio and to prepare for USMLE Step 2 CS Examination.
    - § The year ends early to give students 6 weeks to prepare for USMLE Step 1 Examination.
  - Summative Portfolio
    - § Due at end of Year 2
  - USMLE Step 1
    - § Complete before starting year 3

## **Curriculum Timeline: Year 3**

### Year 3 Curriculum

- Cleveland Clinic Longitudinal Curriculum (CCLC)

All CCLCM students take their required core clinical rotations at the Cleveland Clinic – these include internal medicine, family medicine, pediatrics, surgery, obstetrics and gynecology, psychiatry, neurosciences, emergent care and geriatrics. In addition, approximately 40 university program students also participate in CCLC.

- CCLC is organized into four 12 week blocks as follows:

- § Longitudinal Ambulatory Block – outpatient longitudinal experiences with the same preceptor in internal medicine, family medicine, pediatrics, women’s health with experiences in geriatrics and emergency medicine.

- § Team Based Care 1 – inpatient experiences in internal medicine and surgery

- § Team Based Care 2 – inpatient experiences in pediatrics and obstetrics (4 weeks each)

- § Team Based Care 3 – inpatient and outpatient experiences in neurosciences and psychiatry (4 weeks each)

- § Team Based Care 2 and 3 allow for 4 weeks of elective time each. These electives can be completed at any of CWRU’s affiliated medical centers or medical centers outside of Cleveland/Ohio.

- § Each rotation has defined learning objectives, core clinical conditions that students need encounter (e.g. Diabetes), observed clinical activities (e.g. patient-centered history interviewing) and procedures.

- § Students track these in an online Clinical Assessment System along with reflections on what they learned from each case they encountered.

- § Friday didactic sessions on core topics in clinical medicine

- Longitudinal Learning Groups

Explore the role of the physician in society. Small (8 -10 students) group sessions with 2 faculty facilitators per group. 6 Student led sessions on Fridays (Topics may vary year to year):

- § Physician activism

- § Opioid Crisis

- § Gun Control
- § Disabilities
- § Race and Gender inequities
- § Climate Change and Health
- Longitudinal Didactics
  - § Every 5<sup>th</sup> Friday
  - § Interactive Seminars on
    - Health Systems Science
    - Laboratory Medicine
    - Palliative Medicine
  - § Reflective writing to capture students' experiences related to health systems science in their clinical rotations
  - § Quality improvement proposal
- APM and ARM sessions continue on Friday afternoons

## **Curriculum Timeline: Year 4**

### Year 4 Curriculum

- Research project and masters' level thesis 12-15 months
  - Area of focus
    - § Traditional: Basic/translational or clinical research
    - § Can also focus on health services, biomedical ethics or other areas for advancement of biomedical sciences and care of patients.
  - Approval of research proposal by Research Education Committee prior to start of year
  - Faculty research advisors at Cleveland Clinic or CWRU (except for students receiving specific fellowships at NIH, Sarnoff, Fulbright etc.)
  - Complete thesis research block and thesis defense by mid-December of year 5
  - Defend thesis within 3 months of completing their research, no later than Dec 15 of year 5
- ARM sessions
  - 4 Friday afternoons
  - Covers Hot Topics in Research
- APM sessions
  - Friday afternoons every 8-12 weeks
  - Covers Dilemmas in Professionalism
- Clinical Experience
  - ½ day of clinical experience each week during research thesis block.
- Summative Portfolio
  - Due by end of Year 4



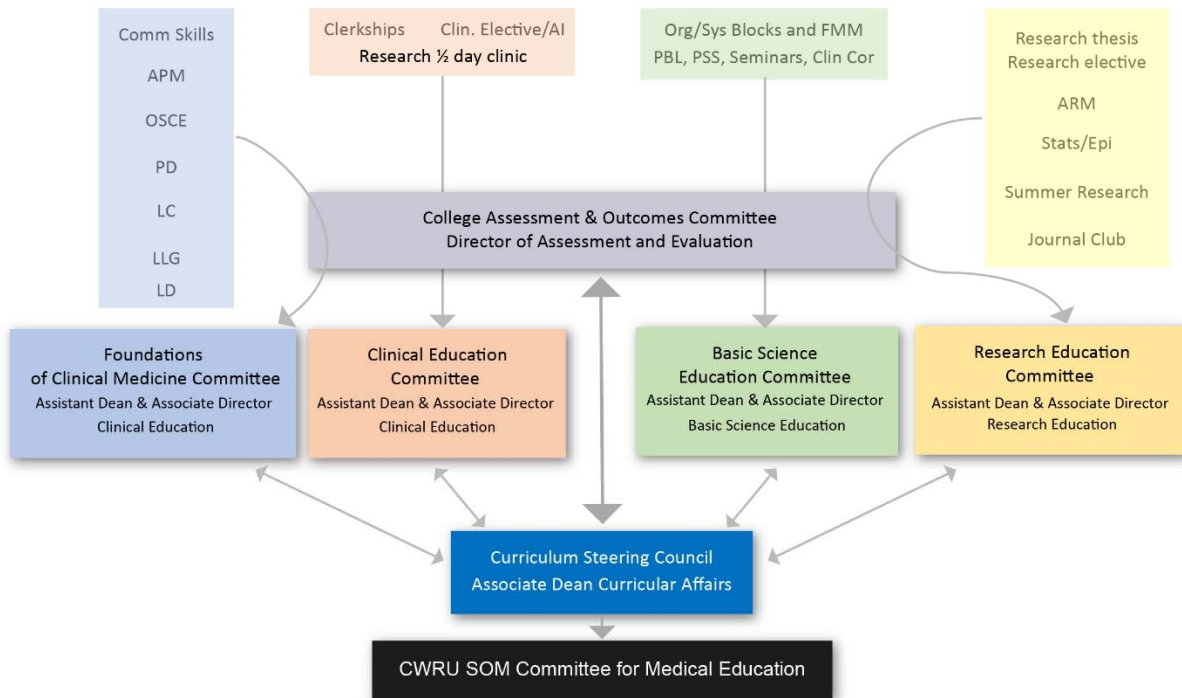
## **Curriculum Timeline: Year 5**

### Year 5 Curriculum

The final year of the curriculum allows students the flexibility to customize their experiences by scheduling acting internships and electives.

- Acting Internships (AI)
  - 2 AIs with at least one in Cleveland at one of the CWRU affiliated medical centers
- Electives
  - The CWRU SOM has eliminated the distinction between clinical and non-clinical electives. Students should work with their physician advisors to determine the appropriate mix of both. The recommended mix of electives is
    - § A minimum of 12 weeks of clinical electives
    - § A maximum of 12 weeks of non-clinical electives
- Research Day
  - Year 5 student present their thesis research projects
  - All other students are required to attend
- Capstone
  - 2 weeks in March of year 5
  - Scheduled around Match Day and Research Day
  - Practical skills to prepare students for Internship
- ARM and APM sessions as in Year 4
- Defend Research Thesis by December 15 of year 5
- Take USMLE Step 2 CK and Step 2 CS by October 31st on Year 5 (February 28th of Year 4 for Class of 2023 and after)
- Take CWRU clinical skills examination before USMLE Step 2 CS.

## Curriculum Committee Structure and Workflow



### Legend

Comm Skills = Communication Skills  
 APM = Art and Practice of Medicine  
 OSCE = Objective Structured Clinical Examination  
 PD = Physical Diagnosis  
 LC = Longitudinal Clinic  
 LLG = Longitudinal Learning Group  
 LD = Longitudinal Didactics  
 AI = Acting Internship  
 Org/Sys = Organ-System  
 FMM = Foundation of Molecular Medicine  
 PBL = Problem-based Learning  
 PSS = Problem-solving sessions  
 Clin Cor = Clinical Correlation Exercises  
 ARM = Advanced Research in Medicine  
 Stats/Epi = Medical Biostatistics and Clinical Epidemiology

## **The Student Portfolio: Competency-Based Assessment and Reflective Practice**

CCLCM's approach to student assessment is based on two key educational concepts – “competency-based assessment” and “reflective practice.” Competency-based assessment emphasizes the need for every student to achieve specified milestones by participating in learning experiences, utilizing helpful resources, and reviewing regular feedback. Students are not compared to one another but to faculty-defined standards of achievement. A full range of assessment methods are used to assess student achievement. Reflective practice emphasizes that learning is dependent upon the integration of reflection and experience. Professionals learn by reflecting on their experiences and by using these reflections to identify learning needs and implementing plans to develop new knowledge and skills. We have designed an assessment process that helps our students develop their reflective practice skills – the ability to accurately describe, analyze and evaluate their performance and to identify and follow through on effective learning plans. We are committed to helping every student achieve our competency milestones and develop reflective practice skills through frequent formative assessments and close advising. Thus the student assessment system is an integral component of the curriculum and supports the learning process; it is not just an intermittent step to determine if a student is ready to progress to the next level of learning.

Evidence of achievement for each of CWRU School of Medicine's competencies (Figure 4) is collected and managed in an electronic portfolio. Students and their advisors share access to the e-Portfolio database of evidence and thus can track and document student progress in meeting the milestones in our nine competencies. A broad range of types of evidence are collected from the learning experiences in the research, basic science, and clinical curriculum (Figure 5).

For example, during research blocks, research preceptors, journal club facilitators, other members of the lab team, problem solving session facilitators, and student peers provide written assessments of both individual work and teamwork in the lab, written and oral presentations, and critical thinking and reasoning skills. Written research proposals and reports and the final thesis are also included in the e-Portfolio database.

During the basic science courses, students complete online quizzes called **Self-Assessment Questions (SAQs)** that cover the breadth of knowledge for each week's theme at the level of factual recall and simple application of the facts. Faculty design the SAQs so that students who are actively participating and studying should expect to know at least 80% of the answers; the individual results of the SAQs are available only to each student, but students are encouraged to contact the course director for help with any difficulties they are having. Students have the option of repeating the SAQs to assess their retention of this basic science knowledge. At the end of each week, students complete open book **Concept Appraisals (CAPPs)** designed to determine if they have mastered the concepts for that week well enough to apply them to new or different problems or situations in a brief, well-organized, clearly written essay. CAPPs are designed to assess depth of knowledge in key concept areas. A faculty-trained assessor reads each CAPPs response anonymously and provides comments to each student about the strengths and areas of improvement related to the student's response. PBL facilitators and peers provide assessments of performance in PBL sessions and self-assessments are also collected.

Assessments in the clinical curriculum include written feedback on performance from preceptors and other faculty physicians and residents, results of OSCEs, patient logs documenting breadth of clinical exposure, self-assessments of videotaped interviews with patients (both standardized and real), and feedback from patients, peers, and other health care providers.

Students are expected to meet regularly with their physician advisors to discuss their progress. Several times each year in Years 1 and 2, they are required to review their assessment evidence in relation to expected levels of milestone achievement in the nine competencies and write Formative Portfolios composed of structured reflective essays on how the evidence demonstrates their development as doctors and researchers. Based on this analysis, they develop learning plans to address areas needing improvement. The essays include judgments on whether previously established learning goals have been achieved and reflections on the process of achieving these goals. Students discuss these materials with their physician advisors during Formative Assessment meetings. During the last three years, students submit learning plans on a bi-annual basis, and meet with their physician advisor to review their progress. Students are expected to assume more and more responsibility and independence in accurate self-assessment, in developing learning plans and following through on addressing their own learning needs, and in recognizing and building on their own strengths.

At the end of Years 1, 2 and 4, students assemble a Summative Portfolio for review by the Medical Student Promotions and Review Committee that determines if the evidence presented by the student indicates a level of achievement sufficient for promotion to the next year of the program (or graduation). Students are expected to choose not only the best examples of their work, but more importantly evidence demonstrating their growth in specific competencies across the first four years of medical school. We want to reward students who recognize areas needing improvement, identify an approach to addressing them, and can show that they have achieved that skill as well as those students who excel in specific areas throughout the year. Graduates of CCLCM not only achieve a defined level of achievement of each of the nine competencies, they also develop their reflective ability to accurately assess their own strengths and areas needing improvement. The assessment process is designed to enhance student learning and the portfolio process enables students to document their progress in the achievement of defined competencies.

## **Graduation Requirements Summary**

To graduate from CWRU School of Medicine with the MD degree (or the MD degree with Special Qualifications in Biomedical Research for students in the Cleveland Clinic Lerner College of Medicine program), students must:

1. Satisfactorily complete all Program Specific Requirements and Educational Program Objectives of the School of Medicine
2. Pass the USMLE Step 1 and USMLE Step 2 CK and CS
3. Pass or remediate the School of Medicine's Clinical Skills Exam
4. Satisfactorily complete the MD Thesis
5. Meet financial obligations to the University
6. Be approved to graduate by the Committee on Students

Approved by the Committee on Medical Education, January 26, 2017

Cleveland Clinic Lerner College of Medicine  
of  
Case Western Reserve University

**CURRICULUM STEERING COUNCIL – MEMBERSHIP 2020-2021**

Lia Logio, MD	Vice Dean, Medical Education, CWRU
Amy Wilson-Delfosse, PhD	Associate Dean, Curriculum, Univ. Program; Professor of Pharmacology, CWRU
Colleen Croniger, PhD	Assistant Dean Basic Science Education, CWRU; Assistant Dean Medical Student Research , CWRU; Associate Professor, CWRU
J. Harry Isaacson, MD	Executive Dean, CCLCM; Associate Professor of Medicine, CCLCM; Staff, Education Institute and Cleveland Clinic Community Care
Christine Warren, MD	Associate Dean, Admissions and Student Affairs, CCLCM; Clinical Assistant Professor of Medicine, CCLCM; Associate Staff, Education Institute and Dermatology & Plastic Surgery Institute (DPSI)
Neil Mehta, MBBS, MS	Associate Dean, Curricular Affairs, CCLCM; Professor of Medicine, CCLCM; Staff, Education Institute and Cleveland Clinic Community Care
Linda Graham, MD	Assistant Dean, Research Education, CCLCM; Professor of Surgery, CCLCM; Staff, Lerner Research Institute and Heart and Vascular Institute
Christine Moravec, PhD  (Michael Lioudis, MD-Proxy)	Assistant Dean, Basic Science Education, CCLCM; Assistant Professor of Molecular Medicine, CCLCM; Staff, LRI Administration; Director of Research Education and Training  (Associate Director, Basic Science Education, CCLCM; Assistant Professor of Medicine, CCLCM; Staff, Cleveland Clinic Community Care)
Craig Nielsen, MD  (Camille Sabella, MD-Proxy)	Assistant Dean, Clinical Education, CCLCM; Associate Professor of Medicine, CCLCM; Staff, Cleveland Clinic Community Care  (Associate Director, Clinical Education, CLCCM; Associate Professor of Pediatrics, CCLCM; Staff, Cleveland Clinic Community Care)
Marcy Pardee	Director, College of Medicine, CCLCM; Education Institute
Beth Bierer, PhD	Director, Assessment and Evaluation, CCLCM; Associate Professor of Medicine, CCLCM; Staff, Education Institute
Colleen Colbert, PhD	Director, Educator and Scholar Development; Associate Professor of Medicine, CCLCM; Staff, Education Institute
Richard Drake, PhD	Director, Anatomy Education, CCLCM; Professor of Surgery, CCLCM; Staff, Education Institute
Bela Anand-Apte, MBBS, PhD	Professor of Ophthalmology, CCLCM; Staff, Cole Eye Institute
Venkatesh Kambhampati, MD	Assistant Professor of Medicine, CCLCM; Staff, Emergency Services Institute
Jennifer Kriegler, MD	Associate Professor of Medicine, CCLCM; Staff, Neurological Institute
Kenneth Koncilja, MD	Assistant Professor of Medicine, CCLCM; Staff, Cleveland Clinic Community Care
Paola Raska, PhD	Adjunct Assist. Professor of Medicine, CCLCM; Project Staff, LRI Quantitative Health Sciences
Adam Lauko, Chan Mi Lee	CCLCM Students, Class 2021
Sophia Colombari Figureo / Jessica Jones / Jacob Knorr	CCLCM Students, Class 2022
Mario Belfiglio / Dena Crozier	CCLCM Students, Class 2023
Samuel Harwood / Samantha Stallkamp	CCLCM Students, Class 2024

# Curriculum Overview Years 1-5

	July	August	September	October	November	December	January	February	March	April	May	June						
Year 1	Orientation	Basic and Translational Research		Break	Cardiovascular & Respiratory Sciences 1		Gastrointestinal System 1		Break	Endocrinology & Reproductive Biology 1		Renal Biology 1	Musculoskeletal Sciences 1	Break	Neurosciences 1	Hematology 1, Immunology & Microbiology		Break
Advanced Research in Medicine 1					Advanced Research in Medicine 1					Advanced Research in Medicine 1								
Foundations of Clinical Medicine 1 Art and Practice of Medicine 1					Foundations of Clinical Medicine 1 Art and Practice of Medicine 1					Foundations of Clinical Medicine 1 Art and Practice of Medicine 1								
Year 2	Break	Clinical Research		Break	Musculoskeletal Sciences 2	Neurosciences 2	Behavioral Sciences	Endocrinology & Reproductive Biology 2		Break	Cardiovascular & Respiratory Sciences 2		Break	Hematology 2		Gastrointestinal System 2	Renal Biology 2	USMLE Study
Advanced Research in Medicine 2					Advanced Research in Medicine 2				Advanced Research in Medicine 2									
Foundations of Clinical Medicine 2 Art and Practice of Medicine 2					Foundations of Clinical Medicine 2 Art and Practice of Medicine 2				Foundations of Clinical Medicine 2 Art and Practice of Medicine 2									
Year 3	Weeks																	
	For years 3-5, the sequence of these rotations including vacations will vary by student																	
	Team Based Care 1 12 Week Rotation			Team Based Care 2 8 Week Rotation 4 Week Elective			Team Based Care 3 8 Week Rotation 4 Week Elective			Longitudinal Ambulatory Block 12 Week Rotation			Vacation 4 Weeks					
	LONGITUDINAL LEARNING GROUP																	
Year 4*	THESIS RESEARCH 48 WEEKS															Vacation + Holidays Total 4 Weeks		
	Outpatient Clinic 1/2 day / week																	
Year 5*	Acting Internships (in town) 4 Weeks		Acting Internships 4 Weeks (may be in town due to pandemic)		Additional Electives† Clinical - Recommended minimum 12 weeks Non Clinical - Recommended 12 weeks †Discuss with Physician Advisor on appropriate mix of both						Vacation 6 Weeks		Capstone 2 Weeks					

\*Includes Advanced Research in Medicine (ARM) 4/5 sessions

Figure 1

# Cleveland Clinic Lerner College of Medicine of Case Western Reserve University

## Year 1 - Curriculum Schedule

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 am —	Anatomy Lab	Art and Practice of Medicine	Seminar	Independent Study	Seminar
10:00 am —	PBL Day 1	Seminar	PBL Day 2		PBL Day 3
12:00 pm —					
1:00 pm —					Advanced Research in Medicine
—	Independent Study*	Clinical Program	Independent Study	Independent Study*	Independent Study
—	or Clinical Program	(one afternoon per week) or Independent Study*	Interprofessional Education	or Clinical Program	
5:00 pm					

\*Dual Degrees course requirement time Monday, Tuesday, Thursday afternoons working around Longitudinal Clinic (LC)

## Year 2 - Curriculum Schedule

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 am —	PBL Day 1	Anatomy Lab or Seminar	PBL Day 2	Independent Study	PBL Day 3
10:00 am —	Seminar	Art and Practice of Medicine	Seminar		Seminar
12:00 pm —					
1:00 pm —					Advanced Research in Medicine
—	Independent Study*	Clinical Program	Clinical Program	Independent Study*	Independent Study
—	or Clinical Program	(two afternoons per week) or Independent Study*	(two afternoons per week) or Independent Study	or Clinical Program	
5:00 pm					

\*Dual Degrees course requirement time Monday, Tuesday, Thursday afternoons working around Longitudinal Clinic (LC)

Figure 2a



Figure 2b

# Curriculum Overview Years 3-5

<b>Weeks</b> <i>For years 3-5, the sequence of these rotations including vacations will vary by student)</i>					
Year 3	<b>Team Based Care 1</b> 12 Week Rotation	<b>Team Based Care 2 *</b> 8 Week Rotation 4 Week Elective	<b>Team Based Care 3 *</b> 8 Week Rotation 4 Week Elective	<b>Longitudinal Ambulatory Block</b> 12 Week Rotation	<b>Vacation</b> 4 Weeks
	Inpatient • Internal Medicine • Surgery	Inpatient • Pediatrics • Obstetrics • Gynecologic Surgery <hr/> Elective (any elective, any place) *May be restricted due to pandemic	• Neurology • Psychiatry <hr/> Elective (any elective, any place) *May be restricted due to pandemic	Outpatient • Internal Medicine • Family Medicine • Geriatrics • Pediatrics • Women's Health Emergency Medicine	
	<b>LONGITUDINAL LEARNING GROUP</b>				
Year 4†	<b>THESIS RESEARCH</b> 48 WEEKS				<b>Vacation + Holidays</b> Total 4 Weeks
	Outpatient Clinic 1/2 day / week				
Year 5†	<b>Acting Internships</b> (in town) 4 Weeks	<b>Acting Internships</b> 4 Weeks (may be in town due to pandemic)	<b>Additional Electives††</b> 24 Weeks	<b>Vacation</b> 6 Weeks	<b>Capstone</b> 2 Weeks
	(Medicine, Pediatrics, Surgery or Family Medicine in Cleveland)		Clinical - Recommended minimum 12 weeks Non Clinical - Recommended 12 weeks ††Discuss with Physician Advisor on appropriate mix of both		

† Includes Advance Research in Medicine (ARM) 4/5 sessions

Figure 3

Cleveland Clinic Lerner College of Medicine  
of  
Case Western Reserve University

**CWRU School of Medicine Competencies, Definitions and  
Educational Program Objectives**

Competency Label Competency Definition	Educational Program Objectives
<b>Research and Scholarship</b>  Demonstrates knowledge and skills required to interpret, critically evaluate, and conduct research.	Analyzes and effectively critiques a broad range of research papers.  Demonstrates ability to generate a research hypothesis and formulate questions to test the hypothesis.  Demonstrates ability to initiate, complete and explain his/her research.
<b>Patient Care</b>  Demonstrates proficiency in clinical skills and clinical reasoning; engages in patient-centered care that is appropriate, compassionate and collaborative in promoting health and treating disease.	Obtains thorough and accurate information through an H&P adapting to the clinical setting.  Uses evidence from the patient's history, physical exam, and other data sources to formulate and prioritize clinical decisions.  Incorporates diagnostic, therapeutic, and prognostic uncertainty in clinical decision making and patient care discussions.  Incorporates patient perspective, values, and goals into all aspects of the clinical encounter.  Identifies and critically analyzes relevant literature and practice-based guidelines to apply best evidence of patient care and management.
<b>Knowledge for Practice</b>  Demonstrates knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care.	Demonstrates ability to apply knowledge base to clinical and research questions.  Demonstrates appropriate level of clinical, basic, and health systems science knowledge to be an effective starting resident physician.
<b>Interpersonal and Communication Skills</b>  Demonstrates effective listening, written and oral communication skills with patients, peers, faculty, and other health care professionals in the classroom, research, and patient care settings.	Uses effective written and oral communication in clinical, research, and classroom settings.  Demonstrates effective communication with patients using a patient-centered approach.  Effectively communicates knowledge as well as uncertainties.

Figure 4

Competency Label Competency Definition	Educational Program Objectives
<b>Professionalism</b> Demonstrates commitment to high standards of ethical, respectful, compassionate, reliable, and responsible behaviors in all settings, and recognizes and addresses lapses in professional behavior.	Consistently demonstrates compassion, respect, honesty and ethical practices. Meets obligations in a reliable and timely manner. Recognizes and addresses lapses in professional behavior.
<b>Systems-Based Practice</b> Demonstrates an understanding of and responsiveness to health care systems, as well as the ability to call effectively on resources to provide high value care.	Applies knowledge of health care systems to patient care discussions. Demonstrates awareness of context of care, patients' values and health care system resources in clinical decision making. Applies principles of quality improvement and safety to patient care.
<b>Teamwork and Interprofessional Collaboration</b> Demonstrates the attitudes, knowledge and skills to promote effective teamwork and collaboration with health care professionals across a variety of settings.	Performs effectively as a member of a team. Respects and supports the contributions of individuals on an interprofessional health care team to deliver quality care.
<b>Personal and Professional Development</b> Demonstrates the qualities required to sustain lifelong personal and professional growth.	Critically reflects on personal values, priorities, and limitations to develop strategies that promote personal and professional growth. Recognizes when personal views and values differ from those of patients, colleagues, and other care givers and reflects on how these can affect patient care and research. Identifies challenges between personal and professional responsibilities and develops strategies to address them.
<b>Reflective Practice</b> Demonstrates habits of ongoing reflection and analysis to both identify learning needs and self-awareness while and continuously improving performance and personal growth.	Demonstrates habits of ongoing reflection using feedback from others as well as self-assessments to both identify learning needs (cognitive and emotional) and practice continuous quality improvement.

Approved:  
CWRU Committee on Medical Education 6/27/19

Figure 4

The Cleveland Clinic Lerner College of Medicine  
of  
Case Western Reserve University

***Student Portfolio System***

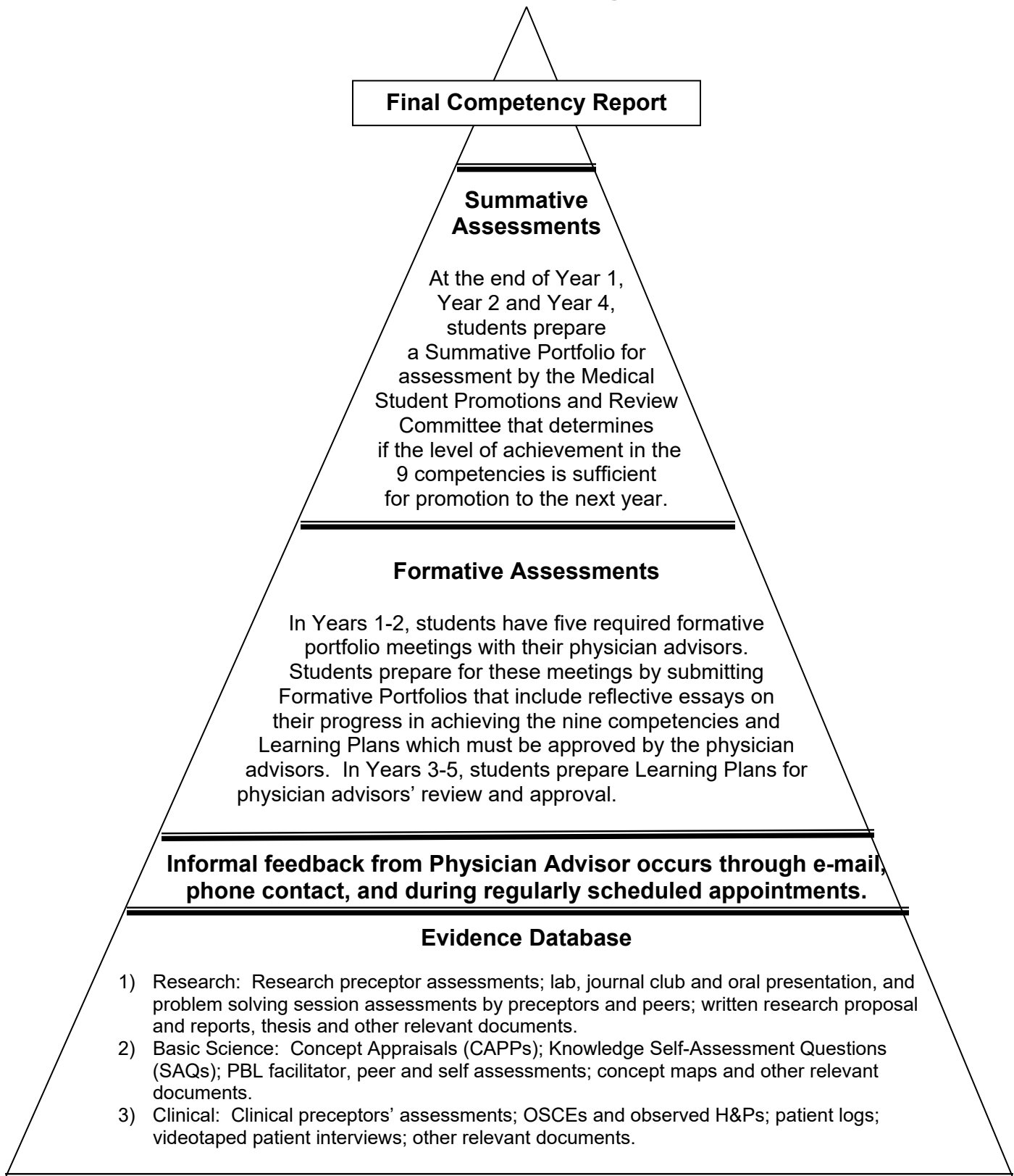


Figure 5

<http://www.clevelandclinic.org/cclcm/>

