GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

Master of Science
in Health Systems

COURSE CATALOG

2024-2026

Accreditation

The Cedars-Sinai Graduate School in Biomedical and Translational Science is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges (WASC).

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QUESTIONS?

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STEPS TO DEGREE

The MSHS program spans five consecutive trimesters, encompassing 13 required courses and one elective. During the initial 16 months, students engage in didactic coursework while concurrently embarking on an independent capstone project under the guidance of an assigned faculty mentor. All mandatory courses are conveniently scheduled in the evenings, catering to the diverse commitments of our students. Our program employs a multifaceted pedagogical approach, blending traditional classroom didactics with interactive sessions, hands-on laboratory experiences, journal clubs, project sessions, and immersive learning within embedded research and operational teams.
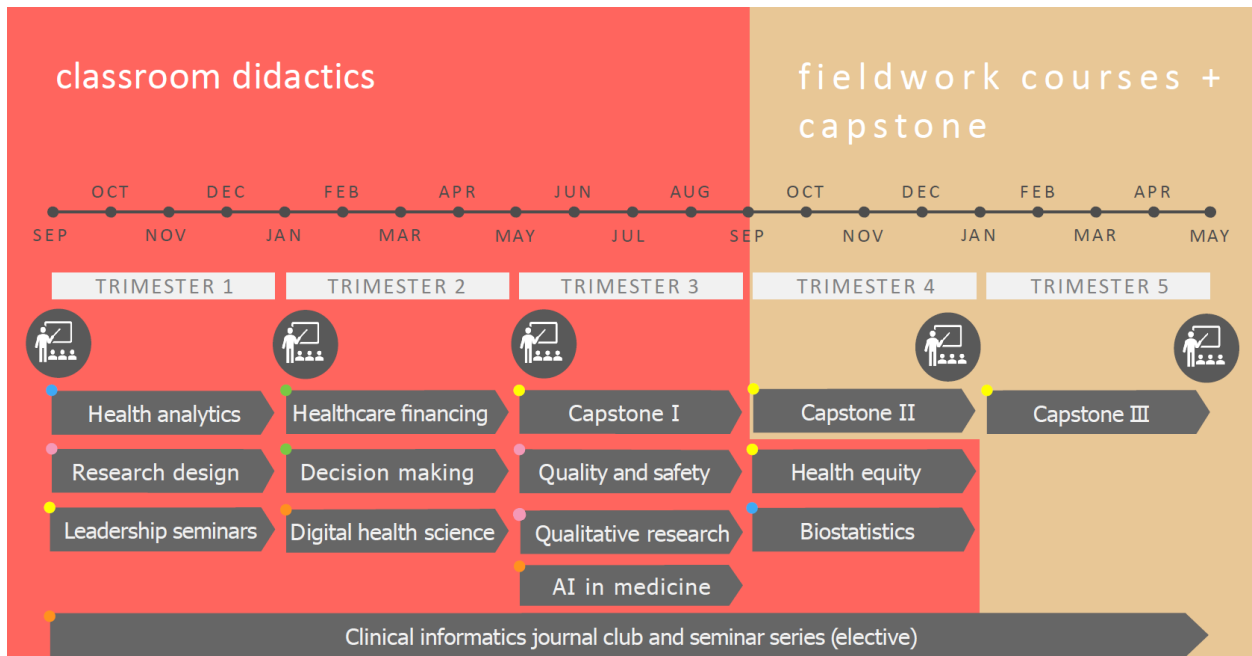
Operating as a hybrid model, the courses predominantly occur online through a remote-learning platform and interactive evening videoconferences. Complementing online learning, each term includes a two-day in-person residential. During these sessions, students are acclimated to the program and coursework, connect with faculty mentors, participate in networking events, and receive hands-on training in various software programs. As a culmination, in the final term, students present the outcomes of their capstone projects to Cedars-Sinai leadership during in-person sessions.

The MSHS faculty underscores the importance of diverse learning experiences, emphasizing the need for a robust theoretical foundation complemented by practical experiential learning to solidify classroom theory. Students also gain proficiency in specific software programs—spanning statistical, data visualization, decision analysis, and spreadsheet applications—through dedicated laboratory sessions. Given the program's competitive nature, we admit a limited number of students each year, ensuring a focused and impactful learning environment.

Program Objectives
Upon successful completion of the MSHS program, graduates will possess the following capabilities:

- **Innovative Insight:** Identify diverse health systems science models and digital health innovations, adept at discerning solutions that enhance the quality, safety, and value of healthcare services.
- **Comprehensive Understanding:** Articulate the key operational functions of the U.S. health system, demonstrating a nuanced comprehension of its intricacies and interdependencies.
- **Research Proficiency:** Employ both quantitative and qualitative research methods proficiently, enabling the evaluation of the effectiveness and economic impact of healthcare innovations with precision.
- **Health Equity Advocacy:** Recognize and address health inequities, leveraging knowledge and skills to actively contribute to the advancement of equitable healthcare solutions.
- **Leadership Acumen:** Demonstrate exemplary leadership skills in successfully managing projects that involve interdisciplinary teams, showcasing the ability to navigate and harmonize diverse perspectives and disciplines.
- **Effective Communication:** Exhibit superior communication skills, effectively conveying information about health systems science interventions to a broad spectrum of stakeholders with clarity and precision.

classroom didactics

fieldwork courses + capstone

TRIMESTER 1	TRIMESTER 2	TRIMESTER 3	TRIMESTER 4	TRIMESTER 5

SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY

Health analytics	Healthcare financing	Capstone I	Capstone II	Capstone III
Research design	Decision making	Quality and safety	Health equity	
Leadership seminars	Digital health science	Qualitative research	Biostatistics	
		AI in medicine		

Clinical informatics journal club and seminar series (elective)

- data analytics core
- health informatics core
- healthcare financing core
- performance and measurement improvement core
- capstone project and leadership seminars

program in brief

20-MONTH PROGRAM

FIRST 16 MONTHS WEEKNIGHT ONLINE CLASSES

LAST 8 MONTHS CAPSTONE PROJECT & FIELDWORK COURSE

RESIDENTIALS IN PERSON CLASSES & NETWORKING

PROGRAM OVERVIEW

FIRST YEAR OF PROGRAM

Trimester 1 (September to December)

- HSS 200A - Health Analytics (2 Credit Hour)
- HSS 203A - Research Design for Health Systems Science (2 Credit Hour)
- HSS 204A - Topics in Healthcare Leadership (1 Credit Hour)
- **HSS 201B - Clinical Informatics and Journal Club (Elective)** (1 Credit Hour)

Trimester 2 (January to April)

- HSS 201A - Principles and Practice of Digital Health Science (2 Credit Hour)
- HSS 202A - Healthcare Financing and Value (1 Credit Hour)
- HSS 202B - Decision Making in Health & Medicine (2 Credit Hour)
- **HSS 201B - Clinical Informatics and Journal Club (Elective)** (1 Credit Hour)

Trimester 3 (April to August)

- HSS 203B - Introduction to Quality, Safety and Performance Improvement (2 Credit Hour)
- HSS 204B - Applied HSS: Capstone (4 Credit Hour)
- HSS 203C - Qualitative Research (1 Credit Hour)
- HSS 201C - AI in Medicine (1 credit hour)
- **HSS 201B - Clinical Informatics and Journal Club (Elective)** (1 Credit Hour)

SECOND YEAR OF PROGRAM

Trimester 4 (September to December)

- HSS 204C - Applied HSS: Capstone (7 Credit Hour)
- HSS 200B - Biostatistics (2 Credit Hour)
- HSS 203D - Topics in Health Equity (1 credit hour)
- **HSS 201B - Clinical Informatics and Journal Club (Elective)** (1 Credit Hour)

Trimester 5 (January to April)

- HSS 204D - Applied HSS: Capstone and Presentation to Leadership (7 Credit Hour)
- **HSS 201B - Clinical Informatics and Journal Club (Elective)** (1 Credit Hour)

Course that are Bold are Optional.

COURSE DESCRIPTIONS

Data Analytics Core

The Data Analytics Core is one of the 4 required core elements of the MSHS curriculum. This core comprises 2 courses: Health Analytics: Collecting, Analyzing and Visualizing Big Data in Healthcare; and Introduction to Biostatistics.

HSS 200A • Health Analytics: Collecting, Analyzing and Visualizing Big Data in Healthcare

Introduces students to the evolving concepts of big data and reviews how networks of data inform healthcare analytics. The overarching goal of HSS 200A is for students to gain familiarity with modern health analytic techniques.

For some of these techniques, the objective will be to develop mere familiarity and knowledge about how the technique is used, what questions it can answer and who to talk to if students ever want to employ the technique—for example, ATLAS.ti coding of text data and performance of computerized conjoint analysis.

For other techniques, the objective is to acquire hands-on skills—for example, data importing, analysis, visualization and reporting using Microsoft Excel and Tableau. In all cases, students will think critically about how to use these techniques to build a more efficient, more effective and less expensive healthcare system.

HSS 200B • Introduction to Biostatistics

Builds off HSS 200A by introducing students to key principles of biostatistics, including confounding, bias, descriptive statistics, hypothesis testing, confidence intervals, power calculations, t-test and chi-squared tests, analysis of variance and multiple linear, and logistic regression analysis.

The course includes lab sessions to familiarize students with using statistical software programs.

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Healthcare Financing Core

The Healthcare Financing Core is 1 of the 4 required core elements of the MSHS curriculum. This core comprises 2 courses: Healthcare Financing and Value; and Decision Making in Health and Medicine.

HSS 202A • Healthcare Financing and Value

Provides an overview of how healthcare is financed in post-ACA America. The class reviews the major payer sources (Medicare, Medicaid, sponsored insurance, ACA plans), presents traditional and alternative payment models, compares volume-based versus value-based payment systems, and discusses how ACOs deliver and finance population health.

Students learn how to analyze healthcare costs and quality from the perspective of different health system stakeholders, including public and private payers; primary care and specialty physicians; hospitals and post-acute care providers; pharmaceutical manufacturers and distributers; and patients.
Students also learn about the organizational changes occurring in the health system associated with changes in healthcare financing.

HSS 202B • Decision Making in Health and Medicine

The class provides students with an introduction to the theory, techniques and practical issues surrounding model development for health economic analysis, with a focus on development and testing of decision trees. Other topics include systematic review and meta-analysis, health status measurement with utilities, budget-impact modeling, and quality assessment of health economic models.

The class consists of interactive lectures supported by hands-on laboratories and reading assignments to become familiar with TreeAge decision-analysis software. Students will learn about tools to determine how best to balance limited resources with demands to deliver high-quality care. The course surveys the fields of statistics, psychometrics, decision analysis, information technology, epidemiology and medicine to illustrate how employing decision science can allow us to make the best possible healthcare decisions when the stakes are high.

Students will develop a strong understanding of the theory and practice of basic decision analysis and the ability to read articles in the field critically. Finally, students receive training to produce their own health-economics models to help healthcare organizations decide whether to fund (or defund) new programs or interventions using varying payer perspectives.

Health Informatics Core

The Health Informatics Core is 1 of the 4 required core elements of the MSHS curriculum. This core comprises 2 courses: Principles and Practice of Digital Health Science; and Clinical Informatics Journal Club and Seminar Series

HSS 201A • Principles and Practice of Digital Health Science

Explore how digital interventions are being employed to drive clinical decisions and offer value to healthcare organizations, their patients and their staffs. Digital health is a broad term that encompasses use of digital devices and platforms, including electronic health records (EHRs), patient-provider portals, mobile health (mHealth) applications and wearable biosensors to improve process and outcomes.
The course begins by focusing on the revolution in remote patient monitoring made possible by ubiquitous broadband networks and wide penetration of smartphones. (Over 80% of the U.S. population now owns a smartphone.)

In addition, it is now possible to supplement patient reported outcomes (PROs) with additional data from remote monitoring, such as from wearable biosensors. Specialized, medical-grade sensors are increasingly approved by the Food and Drug Administration and are useful to monitor physiologic data, from glucose levels to brain function to medication adherence.
The class will also cover the burgeoning ecosystem of mobile health apps, including patient-facing, provider-facing and patient-provider smartphone apps. We will review best practices for mHealth app development and review example of apps that worked—and didn't.

Students will learn how to develop, test and scale apps for patients and providers. We will also review issues surround data security, data storage and data sharing using mHealth applications, and discuss their role within the domain of consumer health informatics.

The class will next explore electronic health records (EHRs), including patient-provider portals. The class will review the different EHR architectures, benefits of cloud-based vs. fixed EHR systems, and ways to leverage the EHR to improve the value of care.

We will then examine technologies gaining traction in digital health, including telemedicine, virtual-reality interventions, and social media, among others. We consider these examples within a framework for making smarter decisions in the age of digital health—a model that brings together what the clinician knows, what the patient wants and what the technologies predict.
In all cases we will explore real-life case studies at Cedars-Sinai and beyond, learning from practitioners in the field using digital health in the clinical trenches.

HSS 201B • Clinical Informatics Journal Club and Seminar Series

Complements 201A. Students meet once a month for interactive sessions to discuss topics in health informatics and health systems science by reviewing new literature using a journal club format.

HSS 201B • AI in Medicine

The goals of this course are to provide an understanding of what AI is and the variety of ways AI is used in medicine. The course will cover the historical uses of AI, both inside and outside of healthcare, and the

successes, failures and increased awareness of AI through the popularity of ChatGPT. This course will evaluate how AI is perceived and used by providers and different patient demographics, AI's complex ethical and moral considerations, its legal implications, and the role of AI in a variety of healthcare settings such as in radiology, dermatology, mental health, and surgery. Student individual work will evaluate the current and future status of AI within a specific area of medicine.

An important but under-considered aspect of AI in medicine is trust, and to better understand it we will study how patients, providers, and other stakeholders perceive and understand AI. To further understand perceptions of AI, we will look at portrayals of AI in the media influencing both fear and excitement, and the financial side of AI from the perspectives of established AI companies and start-ups. Finally, we will consider the opportunities for AI to solve vexing challenges in healthcare, the innovation taking place, and what the future of AI might hold given the rapid evolution.

Students discuss a broad range of health informatics and health systems science topics, including:

- Data-to-knowledge transfer
- EHRs
- Clinical Decision Support
- Medical errors and patient safety
- Health information exchanges
- Data standards
- Health information security
- Health informatics ethics
- Consumer health informatics
- Application of evidence-based medicine
- Public health informatics
- Patient portals and patient-generated data
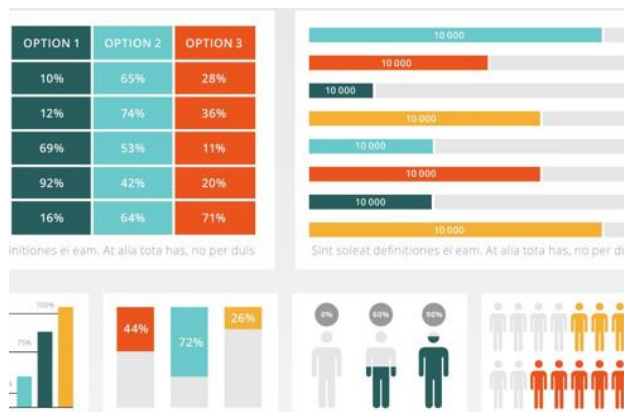
Performance Measurement & Improvement Core

This core comprises 4 courses: Research Design for Health Systems Sciences; Quality, Safety and Performance Improvement; Qualitative Research; and Health Equity.

HSS 203A • Research Design for Health Systems Science

Class topics include using epidemiological methods to evaluate the impact of health interventions on healthcare utilization and quality of care, among others.

The class begins by defining the field of outcomes research and then addresses how healthcare systems measure outcomes and why it matters. Students then explore the difference between randomized controlled trials and pragmatic controlled trials.

HSS 203A explores quasi-experimental designs frequently required for program evaluation, such as interrupted time series and difference-in-difference designs. The course also explores the influence of bias on data interpretation (e.g., selection bias, confounding, attrition and participant bias).

HSS 203B • Quality, Safety and Performance Improvement

Explore issues related to quality and safety in healthcare. The overarching goal of HSS 203B is to introduce the theory and practice of quality measurement. Three scientific disciplines are presented: quality measurement, quality improvement and program evaluation. The class also explores contextual factors that influence quality of care, including health policy and payment incentives, health information technology and controversies such as physician autonomy in an increasingly systematized healthcare environment.

Course material is closely linked to real-world applications, with examples drawn from ongoing hospital, health system and policy initiatives from around the country. Students learn via interactive lectures, journal club sessions analyzing relevant articles, homework assignments, and an in-depth course project. Topics include the different types of measures (e.g., structure, process, outcome), data sources that can be used for measurement (e.g., claims data, electronic health record data, medical record data and patient outcome data), attributes of measures and data sources required to be valid reflections of quality, approaches to quality measure development and quality measures of importance nationally (e.g., HEDIS measures, Medicare quality measures for hospitals, etc.).

Additionally, the course covers strategies for changing clinical practice and improving quality, a field increasingly referred to as implementation science. Diverse schools of thought are drawn upon, including management science, behavioral economics, organizational psychology and performance improvement techniques (e.g., Lean Six Sigma). Evidence from applications to healthcare systems is reviewed, particularly systematic reviews from the Cochrane Collaboration.

HSS 203C • Qualitative Research Elective

Introduces students to the field of qualitative research. The course aims to build understanding of the traditions of qualitative research, and provide hands-on training in designing rigorous qualitative research, conducting data collection, and interpreting qualitative findings. To achieve these aims, students will develop "mock" qualitative research projects focusing on different qualitative methods.

HSS 203D • Health Equity

This course will provide learners the opportunity to examine overarching principles and considerations on how the U.S. healthcare system and other systems impact health, either enhancing or undermining it. A careful analysis of the role of structural racism and discrimination will lay the foundation for the course. In addition, in-depth discussions on how to capture and interpret racial/ethnic/sexual and gender minority data will be included. Furthermore, strategies for engaging community stakeholders in health equity research will be discussed, including a review of evidence-based interventions that aim to help address, understand and possibly reduce health inequities.

Lastly, the roles and responsibilities of all healthcare providers and researchers in closing the equity gap will be widely discussed throughout the course. By the end of the course, learners should have a broad understanding of how social determinants impact health equity, as well as potential mitigation strategies to reduce inequities.

Capstone Project

To complete the MSHS program, students spend 12 months applying classroom theory to the subject of their choosing and produce a presentation about the experience.

The HSS 204 series includes four lockstep courses that build upon one another and culminate in completion of the capstone, delivery of a final written report and oral presentation of the report to Cedars-Sinai leaders. The sequence is as follows:

HSS 204A

Students attend a biweekly seminar in healthcare leadership, where they develop a framework to assume a leadership role in the capstone project as a model for leadership in future organizations. The seminar series consists of highly engaging, interactive didactic sessions that promote discussion and learner engagement. During each session, leaders from diverse areas of the organization share their experience and expertise. Additionally, students prepare presentations based on assigned reading materials, which are followed by interactive discussions about leadership and personal development.

HSS 204B

Project identification and literature review. Students will work with their mentor and an assigned peer-partner to identify an area of opportunity within a healthcare organization that they wish to analyze for

their capstone project. They will also perform a literature search to familiarize themselves with the subject. The course culminates in a formal work-in-progress presentation to the course directors and other students.

HSS 204C

Stakeholder analysis and development of quantitative analysis plan. Students will identify relevant stakeholders for their project and will perform stakeholder interviews. Students will also develop a plan for the quantitative analysis they will perform during the final step of their capstone project. The course culminates in a formal work-in-progress presentation to the course directors and other students.

HSS 204D

Quantitative analysis and final report. Students will perform a quantitative analysis of their choosing, such as a cost-effectiveness analysis, an analysis of existing data, or a meta-analysis. The course culminates in a formal written and oral presentation of the proposal to a committee composed of the program leaders and selected health system leaders. The presentation is open to the entire health system in a public-facing, large-scale forum.

KEY FACULTY

PROGRAM LEADERSHIP DIRECTORS

Brennan Spiegel, MD, MSHS
MSHS Program Director

MSHS Co-Program Director
Christopher Almario MD, MSHPM

COURSE DIRECTORS

Celina Shirazipour, PhD
Course Director for HSS 203C

Brennan Spiegel, MD, MSHS
MSHS Program Director
Course Director for HSS 200A, HSS 201A, HSS 202B

Christopher V. Almario, MD, MSHPM
MSHS Program Co- Director
Course Co-Director for HSS 200A, HSS 202B, HSS 204A, Capstone Series

Jan Michael Ballesteros, PhD
MSHS Program Associate Director, MSHS, Director, Student Affairs
Course Director for Capstone Series, Course Co-Director for HSS 200B, 202A, HSS 203C

Lisa Gualtieri, PhD, ScM
Course Director HSS 201C, Course Co-Director for Capstone Series

Loretta So, PhD, MSN
Course Co-Director for HSS 203B

Lisa Masson, MD, MBA
Course Director for HSS 201B

Jim Mirocha, MS
Course Co-Director for HSS 200B

Gillian Gresham, PhD
MSHS Program Associate Director, MSHS, Director, Faculty Affairs
Course Co-Director for HSS 203A

Marie Lauzon, MS
Course Co-Director for HSS 200B

Carl Berdahl, MD, MS
Course Co-Director for HSS 203B

Laurel Finster, MPH
Course Director for HSS 203D

Marie Lauzon, MS
Course Co-Director for HSS200B

Cody Ramin, PhD
Course Co-Director for HSS 203A

Cohort 2024

TUITION & FEES CALENDAR

Program tuition	Standard amount	Due date
Trimester 1 (5-6) credit hours)	$3,000 - $3,600*	Aug. 3, 2024
Trimester 2 (5-6) credit hours)	$3,000 - $3,600*	Jan. 10, 2025
Trimester 3 (8-9) credit hours)	$4,200 - $4,800*	May 9, 2025
Trimester 4 (10-11) credit hours)	$6,000 - $6,600*	Sept. 5, 2025
Trimester 5 (7-8) credit hours)	$4,200 – $4,800*	Jan. 9, 2025
Total program tuition	$20,400 – $23,400*	

Student fees	Standard amount	Due date
Document Fee	$30	Per Term
Grad Student Association Fee	$10	Per Term
Student Program/ Resource Fee	$40	Per Term
Student Services Fee	$160	Per Term
Technology & Software Fee	$120	Per Term
Library Fee	$40	Per Term
Total student fees (per term)	$400	

Total tuition + student fees (all terms)	$22,400 - $26,400	

- *Per Term credit hours are contingent upon enrollment in the Clinical Informatics and Journal Club Elective (refer to course list)
- **Questions?** Contact Victor Jackson, Student Financial Administrator, 310-423-7871