Course Syllabus

Chaminade University OF HONOLULU

Course Number:	DS 401
Course Title:	Healthcare Informatics
Department Name:	Data Science
School:	School of Natural Sciences and Mathematics
Term:	Spring 2026
Course Credits:	3
Class Meeting Days:	Tuesdays and Thursdays
Class Meeting Hours:	T/Th 11:30 AM - 12:50 PM
Class Location:	CTCC253

Instructor Name:	Helen Turner, PhD (she/her)
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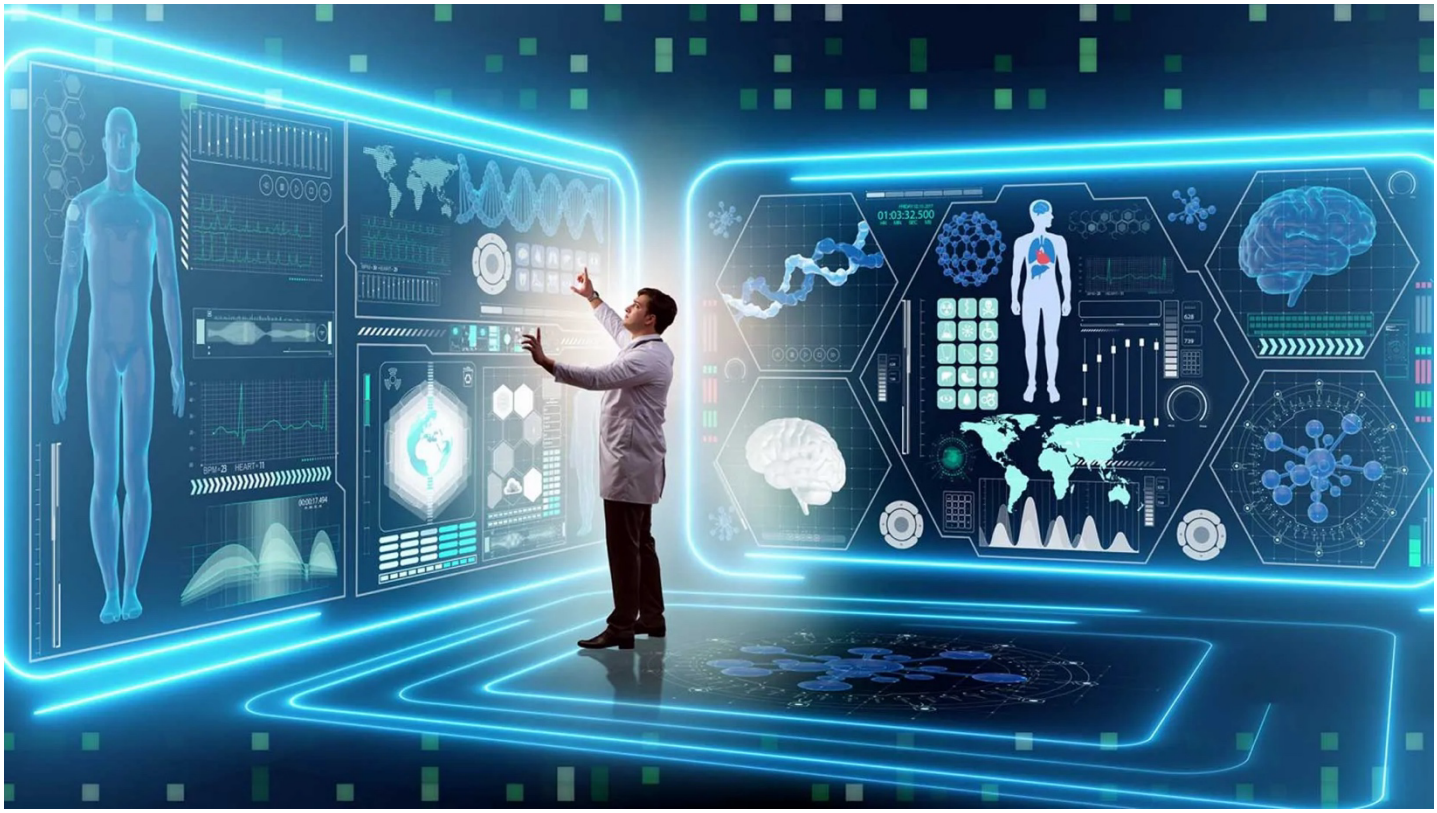

1. University Course Catalog Description

This course examines foundations of health informatics including in terms of its context within the modern health care system and also an understanding of the competencies in relation to health informatics project management. Topics covered include the role of health informatics and analytics in relation to the Affordable Care Act, accountable care organizations, value- based care and population health. This course provides students with an overview of various clinical and administrative information systems and critical functions used in health care (electronic health records, computerized provider order entry, decision support, prescribing, telemedicine/telehealth, and revenue cycle).

2. Course Overview

This course provides a systems-level understanding of healthcare informatics grounded in the WHO digital health data wheel. Students learn how different data types (clinical, administrative, population, genomic, imaging, IoMT, supply-chain, patient-generated, etc.) are created, stored, governed, integrated, and used for analytics and decision support. Focus is on real-world workflows, architecture, interoperability, ethics, and stakeholder ecosystems. The course is primarily conceptual and applied, with one integrative coding module where students work with de-identified multimodal health data to build a simple analytic pipeline.

3. Program Learning Outcomes

B.S. Data Science Analytics and Visualization Program Learning Outcomes

1. Source, describe and curate large data sets ('Big Data') that may not be amenable to traditional hardware and software, and conventional statistical analysis including domain and file specific metadata and the tools built around alternatives to tabular relations that allow the use of multimodal data;	2. Identify, describe and apply foundational mathematical and statistical concepts and operations, including the application of tools such as R, SQL and Python languages, that underlie data sourcing, management, analysis and interpretation;
3. Develop and implement approaches for effective data translation, dissemination and communication between domains, stakeholders and the public;	4. Identify and apply basic data modeling, predictive models and visualizations to support decision-making;
5. Integrate an awareness of ethical issues and collective standards to positively influence the application of data science to service, justice and peace in working towards solutions for societal problems;	6. Explain, plan and execute data science tasks within multidisciplinary teams;
7. Execute a domain-specific capstone project addressing a stakeholder-generated use case.	8. Personal and professional awesomeness

4. Course Learning Outcomes and Linkage to Program Learning Outcomes and Chaminade Educational Values

Course Learning Outcomes	PLO							
	1	2	3	4	5	6	7	8
1. Explain the WHO health data ecosystem and describe the sources, flows, and	X		X		X	X		X

uses of all major healthcare data types.								
2. Map real healthcare workflows and identify data capture points, gaps, and interoperability challenges.	X		X	X				X
3. Interpret key data standards (HL7, FHIR, ICD-10, CPT, SNOMED-CT, LOINC).			X		X			X
4. Evaluate ethical, legal, equity, and governance issues including bias, privacy, and stakeholder impacts.					X	X		X
5. Critically evaluate alignments between stakeholder needs (including patients, caregivers, clinicians, and communities) and health data systems, and propose informatics strategies that close these gaps.	X		X	X	X			X
6. Explain opportunities and concerns surrounding the application of AI and ML to decision support in healthcare	X	X	X	X	X			X

Alignment to Marianist and Native Hawaiian Educational Values:

This course is designed to align technical competencies in health data and informatics with Chaminade University's Marianist Educational Values and Native Hawaiian educational principles. The Course Learning Outcomes (CLOs) emphasize technical proficiency, ethical reasoning, cultural awareness, community responsibility, and adaptive thinking—preparing students to engage health data systems in ways that serve people, communities, and the common good.

Course Learning Outcomes	Marianist and Native Hawaiian Values Alignment:
1.Explain the WHO health data ecosystem and describe the sources, flows, and uses of all major healthcare data types.	This outcome reflects Provide an Integral, Quality Education (Na'auao) and Educate for Adaptation and Change ('Āina) by grounding students in a systems-level understanding of how health data circulates globally and locally. Students develop deep technical knowledge while recognizing that no single system or institution holds all knowledge, echoing the principle 'A'ohe pau ka 'ike i ka hālau ho'okahi. By situating data within real-world health ecosystems, students learn to view information as relational, contextual, and evolving.
2. Map real healthcare workflows and identify data capture points, gaps, and interoperability challenges.	This CLO aligns with Educate in Family Spirit ('Ohana) and Educate for Service, Justice, and Peace (Aloha) by emphasizing collaboration, mutual recognition, and responsibility across healthcare roles. Students learn to see workflows from the perspectives of patients, caregivers, clinicians, and communities, reinforcing 'Ike aku, 'ike mai, kōkua aku kōkua mai. By identifying gaps and breakdowns in data systems, students are encouraged to consider how technical barriers can produce inequitable outcomes and how informatics can be used in service of more just care delivery.
3. Interpret key data standards (HL7, FHIR, ICD-10, CPT, SNOMED-CT, LOINC).	This outcome supports Provide an Integral, Quality Education (Na'auao) by developing students' technical literacy and precision in working with standardized health data. At the same time, it aligns with Educate for Adaptation and Change ('Āina) by helping students understand standards as living infrastructures that evolve in response to changing clinical, regulatory, and cultural needs. Students learn that technical standards are not neutral artifacts, but tools that shape communication, access, and power within healthcare systems.
4. Evaluate ethical, legal, equity, and governance issues including bias, privacy, and stakeholder	This CLO strongly embodies Educate for Formation in Faith (Mana) and Educate for Service, Justice, and Peace (Aloha) by centering

impacts.	ethical responsibility, dignity, and care for the marginalized. Students critically examine how health data practices can reinforce or challenge inequities, aligning with the Marianist commitment to justice and the Hawaiian principle that wisdom must be exercised with moral responsibility. This outcome encourages students to act with integrity, accountability, and respect for persons in the stewardship of sensitive health information.
5. Critically evaluate alignments between stakeholder needs (including patients, caregivers, clinicians, and communities) and health data systems, and propose informatics strategies that close these gaps.	This outcome reflects Educate in Family Spirit (‘Ohana) and Educate for Service, Justice, and Peace (Aloha) by requiring students to center human relationships and lived experience in technical problem-solving. Students are challenged to design informatics strategies that honor diverse stakeholder needs, particularly those historically excluded from health system design. The CLO reinforces a relational ethic of care and responsibility, positioning informatics as a tool for strengthening trust, inclusion, and community wellbeing.
6. Explain opportunities and concerns surrounding the application of AI and ML to decision support in healthcare	This CLO integrates Educate for Adaptation and Change (‘Āina) with Provide an Integral, Quality Education (Na‘auao) by encouraging students to critically assess emerging technologies rather than adopting them uncritically. Students examine both the promise and risks of AI/ML systems, including bias, opacity, and unintended consequences, reflecting the principle that wisdom requires discernment. This outcome prepares students to engage technological change thoughtfully, ethically, and in alignment with community values.

5. Course Prerequisites

None. Come as you are. You do you.

6. Required Learning Materials

The course outline will be provided on Canvas

Technical Assistance for Canvas Users: Search for help on specific topics at help.instructure.com. Chat live with Canvas Support 24/7/365. Watch this video to get you started with online guides and tutorials. Contact the Chaminade IT Helpdesk for technical issues: helpdesk@chaminade.edu, or call (808) 735-4855

The course’s day to day management will be via a Google Drive where student has a folder to submit assignments. There will be some required readings which will be provided in Google drive. You will all be shared on the Google Drive in Week 1.

7. Assessment

Attendance/Participation	600 points	
Homeworks	1300 points (100 each)	
Capstone Essay Assignment	1000 points	
Extra Credit Opportunities	100 points	
Total	**2000 points**	**100%**

8. Grading Scale

Letter grades are given in all courses except those conducted on a credit/no credit basis. They are interpreted as follows:

A 90-100% 1800 points or more

Outstanding scholarship and an unusual degree of intellectual initiative

B 80-89% 1600-1799 points

Superior work done in a consistent and intellectual manner

C 70-79% 1400-1599 points

Average grade indicating a competent grasp of subject matter

D 60-69% 1200-1399 points

Inferior work of the lowest passing grade, not satisfactory for fulfillment of prerequisite course work.

F <60% 1199 points or less

Failed to grasp the minimum subject matter; no credit given

9. Course Schedule

This schedule is meant as a guideline and is subject to change at the instructors' discretion. The student will be notified of any significant deviations from this schedule.

UNIT 1 – FOUNDATIONS OF HEALTHCARE INFORMATICS			
Lecture and Class Activity Topics	**Homework Assignments**	**Lecture attendance**	**Assignment**
		POINTS	
Week 1 – Introduction to Digital Health Systems			
• WHO Wheel of Health Data – overview • Types of healthcare settings and data flows • EHR vs EMR vs PHR	1.1. Download and read the following document: https://www.who.int/docs/default-source/documents/gs4dhdaa2a9f352b0445bafbc79ca799dce4d.pdf Choose one of the **Strategic Objectives** (Page 19-26) and one of the **Frameworks for Action** (page 30-31) and explain how you would apply them to a specific healthcare challenge affecting our communities n Hawai'i and the Pacific islands.	50	100
Week 2 – Health Data Architecture & Workflows			
• Where data originates: registration, triage, labs, pharmacy, imaging, billing, registries, IoMT • Data lifecycle (capture, validate, store, transform, use)	2.1. Map your personal digital healthcare ecosystem 2.2. Map a patient's cancer journey through data	50	50 50
Week 3 – Standards & Interoperability			
• HL7 v2/v3, FHIR • ICD-10, CPT, HCPCS • SNOMED-CT, LOINC, RxNorm • Real-world interoperability failures	3.1. Translate a simple clinical note into structured FHIR format (no code).	50	100
UNIT 2 – DATA TYPES FROM THE WHO WHEEL		Points	
Week 4 – Clinical Care Data			
• Clinical documentation, labs, vitals, progress notes • Temporal data, episodic data	4.1. DAR clinical documentation scenario.	50	100

• Missingness patterns in medicine • Case study: EHR usability & clinician burnout	4.2. Read the following document and write a reflection following the prompts provided. https://oig.hhs.gov/documents/physicians-resources/947/roadmap_web_version.pdf		100
Week 5 – Public Health & Population Data			
• Surveillance data (WHO, CDC, state DOH) *(Class exercise - politically motivated data losses)* • Social determinants of health • Data linkage challenges •	5.1. Watch the following video and write a reflection using the prompts provided. https://www.youtube.com/watch?v=YFC4vEDpyW4	50	100
Week 6: Imaging, Pathology & High-Volume Modalities			
• PACS, DICOM, radiology workflows • Pathology digital workflows • Overview of AI in imaging	6.1. Make a Powerpoint presentation that summarizes two papers you have found in PubMed that discuss case studies of AI use in imaging. Find one paper that describes AI improving patient imaging outcomes and one paper where AI has been detrimental.	50	100
Week 7 – Wearables, IoMT, POS & Remote Monitoring			
• Continuous vs point-in-time data • Home health tech, chronic disease monitoring • Security vulnerabilities • *Class Exercise: Examine a 24-hr wearable dataset*	7.1. Read the following article and write a brief reflection using the prompts provided. https://iapp.org/news/a/the-digital-body-rethinking-privacy-and-security-in-wearable-health-trackers	50	100
Week 8 – Genomics, Biomarkers & Multi-omics Data			
• Genomic data formats (FASTQ, VCF) and ‘omic types • Clinical genomics vs research genomics • Ethical/social risks (eugenics, ancestry inference) • *Guest lecture:* Clinical lab director/genomicist	8.1. Complete the quiz.	50	100
UNIT 3 – HEALTH SYSTEMS, PAYMENT, AND ADMINISTRATION			
Week 9 – Billing, Claims & Payer Data			
• Claims pipelines (CMS, insurers)	9.1. Read the following materials:	50	100

• TCOA, SAI/EFC issues, reimbursement logic • Fraud detection challenges *Guest panel:* insurers, industry professionals	https://www.commonwealthfund.org/publications/issue-briefs/2023/jan/us-health-care-global-perspective-2022#:~:text=Health%20Care%20Spending%20and%20Coverage&text=Since%20then%2C%20spending%20has%20slowed,any%20form%20of%20health%20insurance. Complete the reflection, responding to the prompts provided.		
Week 10 – Clinical Decision Support & Workflow Integration			
• Rules-based CDS vs ML-based CDS • Alerts, alarm fatigue, human-factors alignment • App design for low-burden clinician UX	10.1. **Coding Module** Students receive a de-identified multimodal dataset (EHR tabular + vitals + wearables). **Learning goals:** • Import & clean health data • Join multiple health data modalities • Compute simple analytics (risk score, trend detection, anomaly) • Visualize patient timelines **Tools:** Python or R (student choice; notebooks provided with starter code) **Deliverable:** A short notebook + 2-page interpretation discussing clinical relevance and workflow implications	50	100
UNIT 4 – ETHICS, GOVERNANCE, EQUITY			
Week 11 – Legal & Regulatory Frameworks			
• HIPAA, GDPR, 42 CFR Part 2 • AI governance frameworks (WHO, FDA, NIST RMF) • Consent, data sharing, re-identification risks	11.1. **Match the Rule** For each scenario below, answer **two questions**: 1. **Which framework(s) apply?** (HIPAA, GDPR, 42 CFR Part 2, WHO, FDA, NIST RMF) 2. **What is the main risk or concern?** (privacy, consent, misuse, bias, re-identification, etc.) **Scenario 1**	50	100

	A U.S. hospital shares de-identified patient data with a university research team to train a machine-learning model that predicts hospital readmission. **Scenario 2** A mobile health app developed in Europe uses AI to monitor mental health symptoms and stores user data on U.S.-based cloud servers. **Scenario 3** A substance use treatment clinic wants to share patient records with an emergency department during an overdose event		
Week 12 – Equity, Bias & Power in Healthcare Informatics			
• Differential performance of AI across populations • Indigenous data sovereignty • Structural inequities in datasets • Data suppression practices	12.1. Read this paper and write a reflection using the prompts provided. https://pacifichealthdialog.nz/index.php/phd/article/view/185	50	100
Week 13-15 - Capstone Assignment			
• Class meetings are optional to receive support on your essay writing	13.1. Capstone Assignment Essay: *Exploitation and Stewardship of Healthcare Data in a Global Context*		**1000**

A note on deadlines:
Deadlines are ~2 weeks for most assignments. The Capstone is due at the end of the semester.
I do not penalize for late assignments provided they are submitted prior to the end of the semester BUT the deadlines are provided to HELP you – if you follow them they will keep you on track and prevent work building up to unfeasible levels at the end of the semester.

10. Policies, Guidance and Assistance

Technical Assistance for Canvas Users:

- Search for help on specific topics or get tips in Canvas Students
- Live chat with Canvas Support for students
- Canvas Support Hotline for students: +1-833-209-6111
- Watch this video to get you started
- Online tutorials: click on "Students" role to access tutorials
- Contact the Chaminade IT Helpdesk for technical issues: helpdesk@chaminade.edu or call (808) 735-4855

Tutoring and Writing Services

Chaminade is proud to offer free, one-on-one tutoring and writing assistance to all students. Tutoring and writing help is available on campus at Kōkua 'Ike: Center for Student Learning in a variety of subjects (including, but are not limited to: biology, chemistry, math, nursing, English, etc.) from trained Peer and Professional Tutors. Please check Kōkua 'Ike's website (https://chaminade.edu/advising/kokua-ike/) for the latest times, list of drop-in hours, and information on scheduling an appointment. Free online tutoring is also available via TutorMe. Tutor Me can be accessed 24/7 from your Canvas account. Simply click Account – Notifications – TutorMe. For more information, please contact Kōkua 'Ike at tutoring@chaminade.edu or 808-739-8305.

Late Work Policy

Requests for extensions due to extenuating circumstances (documented computer or medical problems, for example) will be considered but in general work received after the end of the semester will not be graded (i.e., will receive a score of zero).

Grades of "Incomplete"

Should you encounter a significant medical or personal event that prohibits you from completing the course requirements within the time that is allocated for this course, an incomplete grade can be given. Issuance is not automatic, and is at the discretion of the faculty member. An incomplete grade may be assigned to a student who has successfully completed with at least a passing grade the majority of the work of the course, and who has an unavoidable and compelling reason why the remainder of the work cannot be completed on schedule.

Writing Policy

Guidance on written assignment formatting and citation style will be provided in class.

Instructor and Student Communication

Questions for this course can be emailed to the instructors. Online, in-person and phone conferences can be arranged. Response time will take place up to 24 hours..

Disability Access

If you need individual accommodations to meet course outcomes because of a documented disability, please speak with me to discuss your needs as soon as possible so that we can ensure your full participation in class and fair assessment of your work. Students with special needs who meet criteria for the Americans with Disabilities Act (ADA) provisions must provide written documentation of the need for accommodations from Kōkua 'Ike: Center for Student Learning by the end of week three of the class, in order for instructors to plan accordingly. If a student would like to determine if they meet the criteria for accommodations, they should contact the Kōkua 'Ike Coordinator at (808) 739-8305 for further information (ada@chaminade.edu).

Title IX Compliance

Chaminade University of Honolulu recognizes the inherent dignity of all individuals and promotes respect for all people. Sexual misconduct, physical and/or psychological abuse will NOT be tolerated at CUH. If you have been the victim of sexual misconduct, physical and/or psychological abuse, we encourage you to report this matter promptly. As a faculty member, I am interested in promoting a safe and healthy environment, and should I learn of any sexual misconduct, physical and/or psychological abuse, I must report the matter to the Title IX Coordinator. If you or someone you know has been harassed or assaulted, you can find the appropriate resources by visiting Campus Ministry, the Dean of Students Office, the Counseling Center, or the Office for Compliance and Personnel Services.

Attendance Policy

The following attendance policy is from the Academic Catalog: Faculty members should also check with their divisions for division-specific guidelines. "Students are expected to attend regularly all courses for which they are registered. Student should notify their instructors when illness or other extenuating circumstances prevents them from attending class and make arrangements to complete missed assignments. Notification may be done by emailing the instructor's Chaminade email address, calling the instructor's campus extension, or by leaving a message with the instructor's division office. It is the instructor's prerogative to modify deadlines of course requirements accordingly. Any student who stops attending a course without officially withdrawing may receive a failing grade. Unexcused absences equivalent to more than a week of classes may lead to a grade reduction for the course. Any unexcused absence of two consecutive weeks or more may result in being withdrawn from the course by the instructor, although the instructor is not required to withdraw students in that scenario. Repeated absences put students at risk of failing grades. Students with disabilities who have obtained accommodations from the Chaminade University of Honolulu Tutor Coordinator may be considered for an exception when the accommodation does not materially alter the attainment of the learning outcomes. Federal regulations require continued attendance for continuing payment of financial aid. When illness or personal reasons necessitate continued absence, the student should communicate first with the instructor to review the options. Anyone who stops attending a course without official withdrawal may receive a failing grade or be withdrawn by the instructor at the instructor's discretion.

Academic Conduct Policy

From the 2019-2020 Undergraduate Academic Catalog (p. 39):
Any community must have a set of rules and standards of conduct by which it operates. At Chaminade, these standards are outlined so as to reflect both the Catholic, Marianist values of the institution and to honor and respect students as responsible adults. All alleged violations of the community standards are handled through an established student conduct process, outlined in the Student Handbook, and operated within the guidelines set to honor both students' rights and campus values. Students should conduct themselves in a manner that reflects the ideals of the University. This includes knowing and respecting the intent of rules, regulations, and/or policies presented in the Student Handbook, and realizing that students are subject to the University's jurisdiction from the time of their admission until their enrollment has been formally terminated. Please refer to the Student Handbook for more details. A copy of the Student Handbook is available on the Chaminade website. For further information, please refer to the Student Handbook: https://chaminade.edu/wp-content/uploads/2019/08/NEW-STUDENT-HANDBOOK-19-20-Final-8.20.19.pdf

Credit Hour Policy

The unit of semester credit is defined as university-level credit that is awarded for the completion of coursework. One credit hour reflects the amount of work represented in the intended learning outcomes and verified by evidence of student achievement for those learning outcomes. Each credit hour earned at Chaminade University should result in 45 hours of engagement. This equates to one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester, 10 week term, or equivalent amount of work over a different amount of time. Direct instructor engagement and out-of-class work result in total student engagement time of 45 hours for one credit. The minimum 45 hours of engagement per credit hour can be satisfied in fully online, internship, or other specialized courses through several means, including (a) regular online instruction or interaction with the faculty member and fellow students and (b) academic engagement through extensive reading, research, online discussion, online quizzes or exams; instruction, collaborative group work,

internships, laboratory work, practica, studio work, and preparation of papers, presentations, or other forms of assessment. This policy is in accordance with federal regulations and regional accrediting agencies. The minimum 45 hours of engagement per credit hour can be satisfied in fully online, internship, or other specialized courses through several means, including (a) regular online instruction or interaction with the faculty member and fellow students and (b) academic engagement through extensive reading, research, online discussion, online quizzes or exams; instruction, collaborative group work, internships, laboratory work, practica, studio work, and preparation of papers, presentations, or other forms of assessment. This policy is in accordance with federal regulations and regional accrediting agencies.

This is a three-credit hour course requiring 135 clock hours of student engagement, per the official CUH Credit Hour Policy. Students enrolled in this course are anticipated to spend 135 hours working on the class:

35 hours across class sessions/lectures
40 hours in total homework assignments
60 hours researching and completing Assignments