



College of Computing and Informatics
School of Data Science

HCIP 6250 | Capstone - Problem Solving in Health Analytics | 3 credits

Faculty: Rajib Paul, PhD

Email: rajib.paul@charlotte.edu

Office: CHHS 427D

Phone: 704-687-0364

Office Hours: Wednesday, 4 PM – 5 PM, and by appointment

I'm always happy to schedule a mutually convenient time outside of drop-in office hours if you cannot attend these days/times or have questions you would like to discuss between time points. I am happy to address questions you may have via email, as well.

Course Description:

A capstone course with synthesis and application of strategic planning, information technology, and analytic concepts via 'real world' consultative projects grounded in health informatics and analytics.

Pre or Co-requisite:

HCIP 6400 or HADM 6400 or HLTH 6471

Meeting Times:

Wednesdays, 5:30 PM – 8:15 PM

Course Overview:

This course serves as the capstone for the Master of Public Health (MPH) in Population Health Analytics and the Master of Science in Health Informatics and Analytics programs. It is designed to demonstrate and enhance the skills students have learned throughout the program to curate, integrate and visualize health data. The course will also prepare students to enter into/advance within the professional workforce, incorporating the use of LLM AI tools to further enhance data analysis and visualization capabilities.

Each functional area (e.g., informatics, analytics, data interpretation, and reporting) is critical to the population health/healthcare decision processes that these data inform.

Course Objectives:

The goals of this course are to ensure students can: (1) address health questions with an appropriate approach; (2) identify, analyze, and curate health data; (3) code and analyze data to answer a given health related question or provide insight; (4) interpret,

visualize, and communicate analytic results in a meaningful way; (5) work as a team using project management tools; and (5) prepare to enter the professional workforce.

Course Conduct

This capstone class emphasizes team projects as well as to address related professional skills that prepare students to enter into/advance within the health/healthcare professional workforce. Each week during our allotted class time, we will work on and discuss the capstone project and progress within each team.

Student Learning Outcomes

After successfully completing this course, students should be able to:

- Formulate a health question that can be answered using data;
- Locate and identify relevant datasets for the formulated question;
- Curate and evaluate multiple data streams, including data profiling, imputation, and data integration;
- Conduct meaningful analysis and visualization of the data, utilizing open-source tools (e.g., Python/R), commonly used proprietary tools for visualization (e.g., Tableau, Power BI);
- Leverage LLM AI tools to enhance efficiency and creativity in data analysis, such as generating code snippets, suggesting visualization techniques, and refining data narratives;
- Perform effectively on a team using fundamentals of project management.
- Demonstrate effectiveness in organizing, synthesizing, and articulating the interpretation of an analysis;
- Demonstrate ability to effectively develop a professional CV and LinkedIn profile;
- Show ability to respond to a job announcement and interview for a position.

Authorship Agreement:

As you will read further below, one of the final products of this course will be a final paper in publishable form. If the final manuscript is deemed of sufficient quality by the community partner/client and faculty mentor, then we will aim to submit it (or with revisions, as needed, and defined by the community partner/client and/or faculty) for peer-review in and publication within a scientific/scholarly journal, which will most likely occur after the course has been completed. In such circumstances, each student who earns a satisfactory (or above) grade in the course would be a co-author on the paper. As such, I may need to communicate with you beyond the completion of this course for information (updated contact details, clarifications regarding coding, writing, etc.). If I do not hear back from you, then we will use your UNC Charlotte affiliation and email for your contact details for the publication (though, please keep in mind that your university email may expire within a certain time upon graduation). Furthermore, some journals require all authors' signatures and additional information before publication. If this is the case and I am unable to contact you after multiple attempts, then we may have to remove you as a co-author on the publication (Note: However, in such circumstances, you would still be listed in the Acknowledgements section of the manuscript for your contributions.).

Therefore, please be responsive if/when we approach these stages of scholarly dissemination. Additionally, if at any point before and throughout the manuscript

submission for the peer-review process, you do not wish to be a co-author on the publication, then please inform me at any time prior to publication. Note that this aforementioned choice will not affect your course grade.

Finally, we will discuss a UNC Charlotte Authorship Agreement form (see Canvas and <https://legal.charlotte.edu/policies/up-318>) early in the semester and then revisit it later in the semester so that everyone is aware of and agrees to the roles and responsibilities of manuscript authorship.

Authorship Order

It is expected that in a group project, everyone will have equal contributions towards the manuscript. For ordering of the authorship, one way to indicate equal contributions is: we will order the authors by last name and will put a footnote indicating: *These authors contributed equally to this work*. I will be the last and the corresponding author.

AI Use

AI use is permitted in this course. However, some journals where you intend to submit your manuscript may have disclosure guidelines and restrictions. So, please obey such restrictions and guidelines as needed. In general, generating ideas, getting initial idea pointwise, data sources, citations for published articles, help with computer coding, etc., are permitted. I encourage you not to use AI help for writing paragraphs, but rather to use it to enhance your writing and grammatical accuracy. AI cannot be listed as a co-author, and you are fully responsible for the accuracy and content that you are submitting.

Data Security Awareness Training

Since we will be consulting/collaborating with a public health/healthcare community partnership/client organization and working with big data, all students must complete the online (Data) Security Awareness Training. Whether working with publicly available data, free-use secure data, or fee-for-use data, it is important to know and practice issues related to data security. This online training should take about 45 minutes and will need to be completed before the second class meeting. If you have already completed the training, just submit your certification via Canvas. Here is the link to training: Click on "IT Security Training" on the left-hand side under Resources: <https://oneit.charlotte.edu/information-security-compliance/>

Data User Agreement and IRB Training and Approvals/Exemptions

Please note that depending on what type of data you use for the manuscript may require additional data sharing agreements and IRB approval, or exemption. Please refer to [UNC Charlotte's IRB procedure](#) for additional details.

Core Career Competencies

As you progress through your education, there is a need validated by major research organizations for you to gain and master non-cognitive skills known as competencies and carry them into the next phase of your career.

The core career competencies are:

- Critical Thinking
- Communication
- Teamwork
- Technology
- Leadership
- Professionalism
- Career & Self-Development
- Sharing and appreciating multiple viewpoints in a respectful manner

These core competencies describe the requirements of a “career savvy” candidate. These competencies ensure all students are provided with the tools required for career success. This course covers the competencies above.

Required Materials:

1. Laptop or PC, you need to bring every day to class
2. Access to the internet with a secure connection, virus-protected
3. Microsoft Office (assignments must be turned in as a .doc or .docx file), and presentations should be given in PowerPoint
4. R/RStudio installed

Supplemental Resources:

The following supplemental resources are freely available though not required, and additional supplemental resources will be provided on Canvas:

The R Foundation. The R Project for Statistical Computing. Available at: <https://www.r-project.org>. Accessed: 17 August 2025.

RStudio: <https://posit.co/download/rstudio-desktop/>, Accessed: 17 August 2025.

Note: This reference also contains additional helpful resources/text recommendations.

Lane, D. Online Statistics Education: An Interactive Multimedia Course of Study. Available at: <http://onlinestatbook.com>. Accessed: 17 August 2025.

Note: This reference provides additional statistical explanations and examples.

Boston University School of Public Health. Boston University School of Public Health Writing Guide. Available at: <https://populationhealthexchange.org/teph-public-health-writing-guide>. Accessed: 17 August 2025.

Additionally, the following two resources can also be purchased if interested:

Davies, T.M. The Book of R: A First Course in Programming and Statistics. No Starch Press; 2016. <https://www.amazon.com/Book-First-Course-Programming-Statistics/dp/1593276516>

Newton, R.R. and Rudestam, K.E. Your Statistical Consultant: Answers to Your Data Analysis Questions, Second Edition. Sage Publications, 2012 (ISBN-13: 978-1412997591). <https://www.amazon.com/Your-Statistical-Consultant-Analysis-Questions/dp/1412997593>

Grading Criteria:

Course Element	Value
Weekly in-class assignments	150 (25%)
Manuscript Draft – Midsemester Submission	150 (25%)
Manuscript Review	50 (8.33%)
Manuscript – Final Submission	150 (25%)
Professional Development	100 (16.67%)
Total	600 (100%)

Grading Scale:

A 100 % to 90.0%

B <90.0 % to 80.0%

U <80.0 %

Course Assignments:

The primary assignment for this course is to write a manuscript, to submit it to a journal for peer review and potential publication. A typical structure of a quantitative health manuscript is:

- **Introduction:** Address the health problem you are working on, its importance, what is known, where the knowledge gap is, and how your manuscript will fill that gap.
- **Methods:** Give detailed descriptions of data sources, the variables/measures generated from combining multiple data sources. Keep in mind you may need to combine multiple disparate data sources. Next, you will describe analytics and its justification. A sound manuscript should include descriptive/exploratory and inferential analyses.
- **Results:** This section is dedicated to describing all the results from the analysis using figures and tables. Typically, journals require a total number of figures and tables to be around five. All tables and figures should have meaningful captions.
- **Discussion:** Summarize the findings and provide a discussion of what already existed in the literature and its connections to current research findings. Emphasize how your findings contribute to public health policies and practices, or how your findings improve current healthcare practices and settings. Include the strengths and limitations of your research.

- **Conclusions:** This is a concluding paragraph of your research article emphasizing its contributions towards policy and practices in healthcare and the take-home message that you want to convey to your readers.

Each week in class, you will be given a worksheet to complete as a group, which will help us progress towards completing the manuscript by the end of the semester. You will also be required to give brief presentations in class. While not all group members need to give presentations in every class, make sure everyone in a group gets equal opportunities for presentations, as these presentations will count towards your professional development grades. Weekly worksheets will be graded and will count towards in-class weekly assignments.

You will also individually review other groups' work and will provide suggestions for improvement. This is an individual assignment with 8.33% towards the final grade. More information on this assignment will be provided on Canvas.

There will be a final project presentation either on the last day of classes or during the time allotted for final exams. All group members should participate in this presentation, and we will invite interested people from the university and community to join these presentations.

Course Policies:

Syllabus Revision:

The standards and requirements set forth in this syllabus may be modified at any time by the course instructor. Notice of such changes will be made by in-class announcements, Canvas posting, or email notice.

Classroom Conduct:

I will conduct this class in an atmosphere of mutual respect. I encourage your active participation in class discussions. Each of us may have strongly differing opinions on the various topics of class discussions. The conflict of ideas is encouraged and welcome. The orderly questioning of the ideas of others, including mine, is similarly welcome. However, I will exercise my responsibility to manage the discussions so that ideas and arguments can proceed in an orderly fashion. You should expect that if your conduct during class discussions seriously disrupts the atmosphere of mutual respect I expect in this class, you will not be permitted to participate further.

Attendance Generally: Students are expected to attend every class and remain in class for the duration of the session. Failure to attend class or arriving late may impact your ability to achieve course objectives, which could affect your course grade. An absence, excused or unexcused, does not relieve a student of any course requirement. Regular class attendance is a student's obligation, as is the responsibility for all the

work of class meetings, including tests and written tasks. Any unexcused absence or excessive tardiness may result in a loss of participation points.

Late Work and Make-Ups:

- In general, late work will not be accepted with exceptions that are outlined by University policies, such as sickness, death in the family, etc.
- In some situations, I will offer make-up work to make up for missed in-class points; however, this will be decided on a case-by-case basis, and the reason for missing the assignment must be legitimate. As this class relies so heavily on collaboration, making up missed work will be very difficult or impossible in some cases.

Feedback:

Typically, feedback will be returned within one week for small assignments and two weeks for larger papers.

Course Credit Workload:

This 3-credit course requires 9 hours of work a week. Class work may include but is not limited to: required readings, library research, written assignments, discussion posts, viewing of course videos, reviewing feedback from the instructor, and completing assessments.

Webcam Use in the Classroom:

This course may require you to use a webcam for class sessions and/or assessments. Classes and assessments may be conducted using Zoom or other technology selected by your instructor which may use your computer's webcam or other technologies to communicate, monitor, and/or record classes, class activities, and assessments. Assessments may also be conducted using proctoring software, which may listen to you, monitor your computer screen, view you and your surroundings, and record (including visual and audio recordings) all activity during the proctoring process. Please contact your instructor if you are unable to comply or have any questions or concerns.

University Policies and Notices:

Academic Integrity:

All students are required to read and abide by the Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism and other violations are set forth in the Code and on the [Student Accountability & Conflict](#)

[Resolution website](#). The Code is available from the Dean of Students Office or online at legal.charlotte.edu/policies/up-407. Additional resources are available on the [Student Accountability & Conflict Resolution website](#).

Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work.

Use of Unauthorized Materials:

Plagiarism will not be tolerated in any submission; if a submission is deemed to be plagiarized, it will receive zero points.

Policies on the Use of Generative Artificial Intelligence (AI):

Generative AI Permitted in this Course, with Attribution

In this course, students are permitted to use generative artificial intelligence (AI) tools like ChatGPT to support their work. To maintain academic integrity, students must disclose any AI-generated material they use and properly attribute it, including in-text citations, quotations, and references (see, for example, <https://apastyle.apa.org/blog/how-to-cite-chatgpt>). Be aware that students are responsible for any errors or information that is misrepresented or inaccurate (i.e. hallucinations) that generative AI tools produce when submitting work that includes AI-generated material.

Students should also include the following statement in their assignments to indicate use of a generative AI tool: “The author(s) acknowledges the use of [generative AI tool Name] in the preparation or completion of this assignment. The [generative AI tool Name] was used in the following way(s) in this assignment: [e.g., brainstorming, grammatical correction, citation, which portion of the assignment].”

Important Note on Data Protection and Privacy: When using generative AI tools, it is important to be aware that the data you supply might be used for training AI models or other purposes. Consequently, there is no guarantee that the information you provide will remain confidential. You should exercise caution and avoid sharing any sensitive or private information when using these tools. Examples of such information include personally identifiable information, protected health information (PHI), financial data, intellectual property, original research, and any other data that might otherwise be legally protected.

Non-Discrimination:

All students and the instructor are expected to engage with each other respectfully. Unwelcome conduct directed toward another person based upon that person’s actual or perceived race, actual or perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of University Policy 406, The Code of Student

Responsibility. Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct.

Basic Needs:

UNC Charlotte defines basic needs as those needs that, when unmet, can hinder students' ability to focus on and successfully complete their academic studies. Basic needs include food security, housing security, transportation, health and wellbeing, technology and child care. Any student who experiences difficulty in one or more of these areas is urged to contact the Student Assistance and Support Services (SASS) Office for support with navigating campus and community resources. Students can also consult the Niner Needs website for a list of helpful resources designed to address student needs (<https://ninerneeds.charlotte.edu/>).

Title IX:

UNC Charlotte is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or experiences any of these incidents, know that you are not alone. UNC Charlotte has staff members trained to support you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with civil protective orders, and more.

Please be aware that all UNC Charlotte employees, including faculty members, are expected to relay any information or reports of sexual misconduct they receive to the Title IX Coordinator. This means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, I am expected to [report the information to the Title IX Coordinator](#). Although I am expected to report the situation, you will still have options about how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone confidentially, you can contact the following on-campus resources, who are not required to report the incident to the Title IX Coordinator: (1) University Counseling Center (counselingcenter.uncc.edu, 7-0311); or (2) Student Health Center (studenthealth.uncc.edu, 7-7400). Additional information about your options is also available at titleix.uncc.edu under the "Students" tab.

Religious Accommodation:

Students who, acting in accordance with this Policy, miss classes, examinations or other assignments because of a religious practice or belief must be provided with a reasonable alternative opportunity to complete such academic responsibilities. It is the

obligation of students to provide faculty with reasonable notice of the dates of religious observances on which they will be absent by submitting a [Request for Religious Accommodation Form](#) to their instructor prior to the census date for enrollment for a given semester. The census date for each semester (typically the tenth day of instruction) can be found in [UNC Charlotte's academic calendar](#).

Student Grievances:

Student Grievances Students enrolled in courses at the University of North Carolina at Charlotte who would like to file a complaint regarding their experience may do the following: 1. Refer to the UNC Charlotte Student Grievance Procedure. Students may also contact UNC Charlotte's regional accrediting agency, the Southern Association of Colleges and Schools Commission on Colleges. 2. Students residing outside of North Carolina while attending UNC Charlotte may file a complaint in their state of residence. As required by federal regulations, students are directed to the list of resources here, compiled and updated by the State Higher Education Executive Officers.

Withdrawals:

Students are expected to complete all courses for which they are registered at the close of the add/drop period. If you are concerned about your ability to succeed in this course, it is important to make an appointment to speak with me as soon as possible. The University policy on withdrawal allows students only a limited number of opportunities available to withdraw from courses. It is important for you to understand the financial and academic consequences that may result from course withdrawal.

Incompletes:

The grade of I is assigned at the discretion of the instructor when a student who is otherwise passing has not, due to circumstances beyond his/her control, completed all the work in the course. The missing work must be completed by the deadline specified by the instructor, and no later than 12 months. If the I is not removed during the specified time, a grade of F, U, or N, as appropriate is automatically assigned. The grade of I cannot be removed by enrolling again in the same course, and students should not re-enroll in a course in which they have been assigned the grade of I. University policy addressing Incompletes.

FERPA Notification:

In establishing [University Policy 402, Student Education Records](#), UNC Charlotte adheres to a policy of compliance with the [Family Educational Rights and Privacy Act of 1974](#), also known as FERPA, a federal law that affords students the following rights with respect to their education records. For details, see the [FERPA Annual Notification](#) posted on the Office of Legal Affairs website. All questions concerning this FERPA Annual Notification may be directed to the attention of the [Office of the Registrar](#).

Student Consent for Plagiarism Detection Tools:

As a condition of taking this course, all required work/papers may be subject to submission for textual similarity review to [SimCheck](#) (or another plagiarism detection service) for the detection of plagiarism and/or a generative AI detection tool for detection of unauthorized use of generative AI. All submitted papers will be included as source documents in the SimCheck (or other plagiarism detection service) reference database solely for the purpose of detecting plagiarism of such papers. No student papers will be submitted to a plagiarism detection service or a generative AI detection tool without a student's [written consent and permission](#). If a student does not provide such written consent and permission, the instructor may: (i) require a short reflection paper on research methodology; (ii) require a draft bibliography prior to submission of the final paper; or (iii) require the cover page and first cited page of each reference source to be photocopied and submitted with the final paper.

Student Support:**Disability Support Services:**

Students in this course seeking accommodations to disabilities must first consult with the Office of Disability Services and follow the instructions of that office for obtaining accommodations.

The Office of Disability Services works with current undergraduate and graduate students along with prospective students to ensure equal access to UNC Charlotte's campus and educational programs.

All services are dependent upon verification of eligibility. Once approved for services, students receive accommodations which are based upon the nature of an individual's disability and documented needs. Students are strongly encouraged to register or check-in for their accommodations with a Disability Services counselor as soon as they have registered for classes. Accommodations are not retro-active and will not begin until the student notifies his or her faculty by providing the Letter of Accommodation. Please visit the Office of Disability Services at for additional resources, email questions to disability@uncc.edu, or call 704-687-0040 (tty/v) for more information.

Accessing Help/Mental Health Services:

Mental health concerns or stressful events may reduce a student's ability to participate in daily activities or diminish academic performance. Services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via the Counseling & Psychological Services (CAPS) website at caps.uncc.edu.

Student Support Services:

Be sure to take advantage of the wealth of resources and support available at UNC Charlotte. Some of the resources available to you include the University Writing Resource Center, University Counseling Center, and the J. Murrey Atkins Library.

- [University Center for Academic Excellent \(UCAE\) | \(704\) 687 7837 | uncc-ucac@uncc.edu](mailto:uncc-ucac@uncc.edu)
- [University Writing Resources Center \(WRC\) | 704-687-1899 | wrchelp@uncc.edu](mailto:wrc@uncc.edu)
- [Veteran Student Services | 704-687-5488 | veteranservice@uncc.edu](mailto:veteranservice@uncc.edu)
- [University Counseling Center | 704-687-0311](mailto:uncc-ucac@uncc.edu)
- [Multicultural Resource Center | 704-687-7121 | mrc@uncc.edu](mailto:mrc@uncc.edu)
- [List of computer labs on campus](#)
- [Atkins Library Laptop Lending program](#)

Food Insecurity:

Food insecurity is defined by the USDA as “a lack of access to enough food for an active, healthy life.” Food insecure categories include: reduced caloric intake, reduced food quality, lack of variety in diet, disrupted eating patterns, and hunger. Research shows that college students experience food insecurity at higher rates than the American household rate, and that food insecurity can negatively impact academic performance and persistence. In recognition of this problem, UNC Charlotte offers assistance to students facing food insecurity through an on- campus food pantry. The Jamil Niner Student Pantry (JNSP) is located on the east edge of campus at 1224 John Kirk Road. It has regular hours which may change from semester to semester; please see the website at <https://ninerpantry.uncc.edu/> for schedule and details on its services, as well as resources about hunger and food insecurity among college students.

Day/Week	Activity	Assignments Due
8/20/25	Introductions, Syllabus Discussion, Project Group Formation, Problem Identification	Group Assignment due: Names and emails of group members, problem statement, knowledge gap, and motivation
8/27/25	Modifying the problem statement, formulate potential hypotheses, and work on the introduction section	Weekly assignment on hypotheses and motivation is due
9/3/25	Identify potential data sources and create variables	Weekly assignment on a list of dependent and independent variables
9/10/25	Creating an analytic dataset and writing the first draft of the methods section	Draft of methods section due
9/17/25	Descriptive Analysis	Tables and Figures from the descriptive analysis are due
9/24/25	Individual Group Meetings via Zoom on inferential analysis	A draft plan for inferential analysis is due
10/1/25	Individual Group Meetings via Zoom on inferential analysis	Some figures and tables from the inferential analysis are due
10/8/25	Finalize the analysis	Submit all figures and tables from descriptive and inferential analyses
10/15/25	Identify potential journals and complete the first draft of the results section	First draft of the complete results section is due
10/22/25	Start working on the discussion section	A plan for the discussion section is due
10/29/25	Complete first draft of discussion and conclusion sections	First draft of the discussion and conclusion section
11/5/25	Visit from the UNC Charlotte Career Center: Cover letter, CV, and LinkedIn accounts	

11/12/25	Complete the first draft of the entire manuscript	Midsemester manuscript submission
11/19/25	Address the reviews pointwise, and revise the manuscript as necessary	Reviews of the manuscript are due before class
12/10/25	Finalize the manuscript and prepare the journal cover letter. Group Project Presentations	

Tentative Schedule: This schedule is a fairly reliable guide but may be modified at any time by the course instructor. Any changes will be notified by in-class announcements, posting on Canvas, or email communications.