



Data Analytics and Artificial Intelligence in Cancer Research

HCISR_DATAPUBH 350_01012026

DATA SCIENCE • PUBLIC HEALTH • BIOMEDICAL DATA ANALYTICS

Credits

3

Contact Hours

40

Term

Summer

Course Description

The rapid growth in the volume and complexity of biomedical data has transformed how researchers investigate cancer and evaluate potential treatments. This course introduces undergraduate students to the role of data analytics and artificial intelligence in contemporary cancer research.

Students explore how biomedical datasets are used to examine relationships between clinical variables, biological markers, and disease outcomes. The course focuses on the analytical logic behind modern research tools used in cancer data analysis, including Python-based analytical environments and automated machine learning platforms such as KNIME, H2O-3.

Through guided analytical exercises using curated cancer datasets, students practice interpreting data patterns and understanding how analytical outputs inform biomedical research. Instruction combines seminar discussion with applied data interpretation workshops, guest lectures from biomedical researchers, and site-based academic engagement related to health research and data science in Athens.

By the end of the course, students develop the ability to interpret biomedical data and communicate data-informed insights relevant to cancer research.

Course Requirements

Required Text

Digital access and/or copies will be provided at no cost to students.

Additional Readings and Resources

Selected readings and digital resources will be provided to introduce students to foundational concepts in machine learning, biomedical data analysis, and cancer research. Materials may include short research articles, introductory resources on data analytics in biomedical research, and selected examples of analytical tools used in cancer data analysis.

Instructor-provided datasets, visualizations, and structured analytical templates will be used throughout the course to support guided data interpretation exercises.

Assignments

Course Requirements	Percentages
Seminar participation and discussion	20%
Guided data interpretation exercises	30%
Short analytical reflections	20%
Final Data Interpretation Brief	30%
Total	100%

Assignment Descriptions

1

Participation in Workshops and Discussions

Active participation in seminar discussions is required. Students engage with assigned readings and contribute to guided discussions on how biomedical datasets are used in cancer research. Participation also includes involvement in structured class discussions examining case studies from cancer data analysis and discussions connected to guest lectures and site-based academic activities.

2

Guided Data Interpretation Exercises

Students complete short analytical exercises based on curated cancer datasets provided by the instructor. Using prepared tables, visualizations, or worksheets, students examine patterns in clinical or biological variables and interpret simplified analytical outputs used in biomedical research.

3

Short Analytical Reflections - Assignment Descriptions

Participation in Workshops and Discussions

Active participation in seminar discussions is required. Students engage with assigned readings and contribute to guided discussions on how biomedical datasets are used in cancer research. Participation also includes involvement in structured class discussions examining case studies from cancer data analysis and discussions connected to guest lectures and site-based academic activities.

Guided data interpretation exercises

Students complete short analytical exercises based on curated cancer datasets provided by the instructor. Using prepared tables, visualizations, or worksheets, students examine patterns in clinical or biological variables and interpret simplified analytical outputs used in biomedical research.

Short analytical reflections

Students submit short written reflections (about 500 words) responding to specific case studies discussed in class. Reflections connect course concepts, such as data interpretation, the role of analytical tools in biomedical research, and ethical considerations in AI and health data, with real-world examples from cancer research.

4

Final Data Interpretation Brief

Students prepare a short analytical brief (about 800 words) interpreting a curated cancer dataset discussed during the course. Each student addresses a specific analytical prompt assigned by the instructor, such as patterns in clinical variables, treatment outcomes, or limitations of the dataset. The brief focuses on interpreting observed patterns, discussing potential research implications, and evaluating the limitations of data-driven approaches in cancer research.

Grading Scale

Grade	Percentage
A+	98-100
A	94-97
A-	91-93
B+	88-90
B	84-87
B-	81-83

Grade	Percentage
C+	78-80
C	74-77
C-	71-73
D	60-70
F	Below 60

Learning Outcomes and Assessment Measures

On completion of the course, students should be able to:

Learning Outcomes	Course Requirement(s) used to assess achievement
Interpret patterns in biomedical datasets related to cancer research.	Guided data interpretation exercises
Analyze patterns and relationships between clinical variables, biological markers, and disease outcomes in cancer datasets.	Guided data interpretation exercises
Explain how analytical tools and machine learning methods are used in biomedical research.	Seminar participation and discussion; short analytical reflections
Evaluate the strengths and limitations of data-driven approaches in cancer research.	Short analytical reflections; final data interpretation brief
Communicate data-informed insights related to cancer research.	Final data interpretation brief

Course Outline

Session	Topic	Planned Activities & Field Components
Session 1	Introduction to Biomedical Data in Cancer Research	Course orientation; seminar discussion
Session 2	Biomedical Variables and Research Questions	Guided discussion
Session 3	Interpreting Patterns in Cancer Data	Guided data interpretation exercise
Session 4	Data Visualization in Biomedical Research	Data visualization interpretation exercise
Session 5	Introduction to Machine Learning in Cancer Research	Seminar discussion of research examples
Session 6	Analytical Tools in Biomedical Data Research	Demonstration of analytical tools (Python, KNIME, H2O-3)
Session 7	Interpreting Analytical Outputs	Guided data interpretation exercise
Session 8	Evaluating Data-Driven Evidence	Case study discussion
Session 9	Ethics in AI and Biomedical Data	Guest lecture; analytical reflection
Session 10	Biomedical Research in Practice	Site-based academic activity
Session 11	Analytical Synthesis Workshop	Workshop preparing final data interpretation brief
Session 12	Course Synthesis and Presentations	Student presentations of final briefs

Other Policies

Expectations

The HCISR academic community encourages civility, respect for the rights and opinions of others, and academic integrity. Students are required to comply with principles of academic integrity and bear responsibility for their academic work. All submitted academic work must represent the student's original work and appropriately cite all sources used. Any act of academic misconduct, including fabrication, forgery, plagiarism, cheating, or facilitating academic dishonesty, will result in disciplinary action.

Attendance/Participation

The academic program is organized around classroom instruction and structured experiential learning. Attendance is therefore crucial to academic success. Prompt attendance, full preparation, and active participation in all class sessions, applied workshops, and supervised site visits are required. There are no unexcused absences. Repeated absences will negatively affect the student's grade.

In the case of illness, students must notify the course coordinator by SMS or WhatsApp at +30 697 483 1229 at least 30 minutes prior to the start of class.

Course Policies

For official course communications, students must use their Arcadia University email account. Students are responsible for any information provided by email or through the designated learning management system. This syllabus is subject to change, and any updates will be communicated through official course channels.

Academic Integrity & Student Policies

Plagiarism

Representation of another's work or ideas as one's own in academic submissions is plagiarism, and is cause for disciplinary action. Cheating is actual or attempted use of resources not authorized by the instructor(s) for academic submissions. Students caught cheating in this course will receive a failing grade. Fabrication is the falsification or creation of data, research or resources to support academic submissions, and cause for disciplinary action.

Late or Missed Assignments

Late or missed assignments will not be accepted for grading unless prior arrangements have been approved by the instructor due to documented extenuating circumstances.

Students with Disabilities

Persons with documented disabilities requiring accommodations to meet the expectations of this course should disclose this information during program enrollment and prior to the start of term so that appropriate academic arrangements may be made.

Incident Reporting and Compliance with Sexual Harassment and Misconduct Policies

The Hellenic Center for Interdisciplinary Studies and Research (HCISR) serves as the on-site academic and operational provider for this course. Students experiencing any incident impacting their safety, well-being, or academic participation—including, but not limited to, reports of possible crime, behavioral issues, discrimination or harassment, sexual misconduct, hospitalization, other health concerns, or issues prompting early program departure ("Incidents")—are encouraged to immediately contact HCISR staff for local support and guidance.

Arcadia University, as the School of Record, is committed to supporting students abroad who are affected by such incidents. This may include academic and classroom supportive measures. While Title IX does not extend to classes off U.S. soil, Arcadia University complies, where applicable, with its [University's Policy Prohibiting Discrimination and Harassment](#) and relevant laws for all programs operating under its auspices. Information regarding formal reporting procedures and available student support resources is provided in the [Arcadia Student Handbook](#).

Prerequisites

No formal prerequisites. The course is open to undergraduate students from diverse academic backgrounds. Basic familiarity with statistics, data analysis, or introductory programming may be helpful but is not required.

Country and Program Connection

This course is delivered within the **Ascle+ Athens Experience**, an interdisciplinary academic program based in Athens, Greece, offered by the **Hellenic Center for Interdisciplinary Studies and Research (HCISR)**. The program integrates public health, biomedical science, and applied health research through structured academic coursework and experiential learning.

Within this context, the course situates data-driven biomedical research within the broader European healthcare and research environment. Athens provides a contemporary setting for exploring how biomedical data, digital health technologies, and emerging analytical tools are used in health research and innovation. Through guest lectures and site-based academic engagement with local research and health organizations, students connect analytical methods with real-world applications in biomedical and public health research. The course complements the program's interdisciplinary focus on health, prevention, and evidence-based approaches to health science within the Athens-based curriculum.

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Ready to Study Data Analytics & AI in Cancer Research in Greece?

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