

DTSC- 3601-3602: Predictive Analytics and Their Impacts

Fall 20925 Course Syllabus

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Course Content and Office hour details are accessible via Canvas

Syllabus Overview

This syllabus contains the policies and expectations established for DTSC 3601-3602, Predictive Analytics and Their Impacts. Please read the entire syllabus carefully before continuing in this course. These policies and expectations are intended to create a productive learning atmosphere for all students. Unless you are prepared to abide by these policies and expectations, you risk losing the opportunity to participate further in the course.

Required Text & Materials:

(1) Textbook: There is no textbook for this course (no purchase required). Required readings may include chapters, online articles, and analytics use cases. These resources are free and will be posted or hyperlinked on the class Canvas page well in advance of the relevant class period.

(2) Software: This class will use Python, Tableau, and OpenSource tools (such as LLM, GitHub, Colab).

(3) Supplementary Materials: Lecture presentations, assignments, quizzes, and additional course materials will be posted and managed in the course section on Canvas.

(4) All students are required to have their own personal laptop computer which should adhere to the minimum requirements as per the laptop policy. Students must have a working webcam and microphone in their laptop.

Pre-requisites:

Studio 1 and Studio 2

Course Description:

In this studio, students learn the ethical use of machine learning to develop models and predictive features from unstructured data to explore a data science approach to socially relevant challenges. Validity of predictions is analyzed using appropriate statistical hypothesis tests. The ethical implications of collecting and using data from external sources are also discussed.

Learning Outcomes

By the end of this course, students will be able to:

- Define predictive analytics questions
- Identify, gather and pre-process data needed for the analysis
- Identify the appropriate method for a predictive analysis problem
- Demonstrate building effective predictive models using machine learning algorithms
- Develop familiarity with popular tools and software used for predictive analytics
- Test the validity of predictive models and interpret and report on results
- Understand the implications of cognitive bias and variance in data on the design and performance of predictive models.

Outline of Course Content

1. Intro to Predictive Analytics for Business
2. Data Sourcing, Preparation & Cleaning
3. Review of selected Modeling topics
4. Use of GitHub, API's and other deployment strategies
5. Segmentation: Demographics, Psychographics & Predictive Clustering.
6. Bias in Decision-Making: Human Judgment and Predictive Models
7. Bias-Variance Tradeoff in Business Forecasting
8. Overfitting & Underfitting in Business Models
9. Data Governance & Business Access Issues
10. Missing Data & Business Impact
11. Model Explainability & Responsible AI Design
12. Communicating with Non-Technical Stakeholders
13. Presentation Skills and Peer Review

Teaching Strategies:

Materials presented in this course will be covered through lectures, homework, in-class exercises and student presentations, and role playing. This course follows teaching methods grounded in an interdisciplinary studio style approach to learning in which students are presented with cross-disciplinary data science challenges that guide the mini-lectures, in-class activities, and group data-driven projects. Students are expected to participate in discussions, problem-solving, critical thinking exercises, analysis of case studies, collaboration, peer-teaching, and design and critique sessions. All students are expected to contribute in a meaningful way to team efforts. The course includes small group writing and presentation assignments that are the basis for formative assessment.

Grading

Assignment Type	% of Final Grade
In-class Assignment and Quizzes	15 %
Hands-on Homework	30 %
Midterms	25 %
Group Use Case Project & Presentation	30 %
Total	100%

- Earning 60% or higher = PASSING the course
- Earning 59% or less = FAILING the course (see table below)
- To progress from DTSC 3602, a student must earn D or better in DTSC 3601

% Grade	Final grade assigned
90% – 100%	A
80% – 89%	B
70% – 79%	C
60% – 69%	D
0% – 59%	E

Course Project:

An important component of our course is participating in a project and working within a team. Students will be placed in teams of 3-4 students working on a predictive analytics project. The goal of this project is to practice and utilize the major prediction methods and tools in a practical context. Teams will work on addressing a specific problem within certain constraints and requirements. During the semester students will be given opportunities to come up to speed on the programming languages and/or software technologies needed for this project. The project will include several milestones for teams to work on drafts, receive feedback and complete revisions. It is imperative that students take advantage of all the practice opportunities presented in the course to be better prepared for the project deliverables. A project grade will be adjusted for their individual contribution to the project deliverables.

Late Homework and Assignments:

It is important to submit all assignments by the designated due dates and times to ensure timely feedback and progression through the course. The following penalties will be applied to late submissions:

- 1-2 hours late: 25% deduction from the assignment's total grade.
- After 12 hours late, up to 24 hours late: 50% deduction from the assignment's total grade.
- More than 24 hours late: No credit will be given for the assignment.

Attendance:

Students are expected to attend all class meetings and to arrive before the class starts. Class topics are integrated, with each week building on prior weeks. Failure to attend or to arrive on time can adversely affect individual performance, ability to contribute to the group project, and the earned letter grade. If a student misses a class due to work or other reasons, it is their responsibility to get notes from peers; instructors do not hold extra repeat class sessions.

Students are encouraged to work directly with their instructors regarding class absences for medical appointments, military/court orders, and/or personal and family emergencies, such as a death in the immediate family, where a student is able to provide an instructor with appropriate supporting documentation of the absence. The final decision for approval of absences and missed work or make-up work is determined by the instructor.

The Office of Student Assistance and Support Services (SASS) can provide notification to faculty of emergency situations when a student is unable to do so and when the office has been made aware of such emergencies. In such situations, the SASS office may also be able to assist with verification of such emergencies once a student is able to return to classes. The SASS office does not provide verification of absences for car trouble, weather issues, personal activities, work, weddings, vacations, or University-sponsored events. Absences related to such activities should be discussed directly with the faculty member.

In cases of absence due to pregnancy or parenting (pregnancy, childbirth, false pregnancy, termination of pregnancy, or recovery from any of these conditions), students should contact the Title IX Office to obtain absence verification by completing the form at <http://bit.ly/332eaGd>.

Electronic Devices:

Students are not allowed to use any electronic devices during the class, unless otherwise instructed by the instructor.

Inclement Weather:

[University Policy](#) states the University is open unless the Chancellor announces that the University is closed. The inclement weather hotline number to call is 704-786-2877. [In the event of inclement weather, check your email and NinerAlerts](#). The instructors generally only cancel class if the University is closed.

Self-Help:

It is common for college students to experience challenges that may interfere with academic success such as academic stress, sleep problems, juggling responsibilities, life events, relationship concerns, or feelings of anxiety, hopelessness, or depression. If you or a friend is struggling, we strongly encourage you to seek support. Helpful, effective resources are available on campus at no additional cost.

- Visit the Counseling and Psychological Services website at caps.charlotte.edu for information about the broad range of confidential on-campus mental health services, online health assessments, hours, and additional information.
- Call CAPS at (704) 687-0311 if interested in scheduling an appointment with a counselor. After-hours crisis support is also available through this phone number.

Copyright:

Course Material Use Lectures and course materials, including presentations, tests, exams, outlines, and similar materials, are protected by copyright. You may take notes and make copies of course materials for their own educational use. However, you may not, nor may you knowingly allow others to reproduce or publicly distribute course materials including, but not limited to, lecture notes, assignments, or tests without the express written consent of the instructor(s). This includes providing materials to commercial course material suppliers such as Course Hero, Chegg, Quizlet, GitHub, or other similar services. Students who publicly distribute or display or help others publicly distribute or display copies or modified copies of an instructor's course materials may be in violation of University Policy 406, The Code of Student Responsibility. If the instructor is interested in posting your answers or papers on the course web site, the instructor will obtain your written permission.

Generative AI Use:

Generative AI Permitted in this Course Only as Designated, with Attribution In this course, students are permitted to use generative AI tools such as ChatGPT only for specific assignments, and only as designated by the instructor. 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. In addition, use of a generative AI tool that is not specifically authorized by the instructor may constitute a violation of the Code of Student Academic Integrity. 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, financial data, intellectual property, original research, and any other data that might otherwise be legally protected

Code of Student Responsibility:

"The *UNC Charlotte Code of Student Responsibility* (the Code) sets forth certain rights and responsibilities in matters of student discipline. The Code defines these responsibilities and guarantees you certain rights that ensure your protection from unjust imposition of disciplinary penalties. You should familiarize yourself with the provisions and procedures of the Code" (Introductory statement from the UNC Charlotte brochure about the Code of Student Responsibility). The entire document may be found [here](#).

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 are set forth in the Code. The Code is available from the Dean of Students Office or online.

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.

Diversity Statement:

UNC Charlotte strives to create an academic climate in which the dignity of all individuals is respected and maintained. Therefore, we celebrate diversity that includes, but is not limited to ability/disability, age, culture, ethnicity, gender, language, race, religion, sexual orientation, and socio-economic status.

All students are required to abide by the [Sexual Harassment Policy](#) and the [Standard for Responsible Use of Information Resources](#). Sexual harassment, as defined in the UNC Charlotte Sexual Harassment Policy, is prohibited, even when carried out through computers or other electronic communications systems, including course-based chat rooms or message boards.

Religious Accommodation:

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](#) 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](#).

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.charlotte.edu/> for schedule and details on its services, as well as resources about hunger and food.

Syllabus Revisions:

We reserve the right to modify the standards and requirements set forth in this syllabus at any time to respond to changing circumstances or new information or to correct errors or inaccuracies. Notice of such changes will be posted to Canvas and usually accompanied by an Announcement. It is always your responsibility to be aware of the requirements of this course.