

# Business Machine Learning

IFI 8420, Spring 2022

## Instructors:

Professor. Yanqing Wang  
Institute for Insight, Robinson College of Business  
Email: [ywang159@gsu.edu](mailto:ywang159@gsu.edu)

**Office hours:** 11:00am – 1:00 p.m. Fridays, or by appointment.

<https://zoom.us/j/5133261237?pwd=M29EVytVZS9PcVNKNUpyWVpveTAzdz09>

Our TA is Animesh Jain, his email: [ajain36@student.gsu.edu](mailto:ajain36@student.gsu.edu)

**Prerequisites:** IFI 8410

## Course Description:

This course provides an introduction to machine learning and artificial intelligence to help you understand the implications of these new technologies for business strategy and deploying these methods to create value. The topics covered include supervised and unsupervised learning, linear and nonlinear regression/classification and boosting techniques. The methods are taught through business applications. Since unstructured data comprises a large and important source of information, we cover deep learning techniques to tackle complex problems such as image understanding and analytics. The unique set of problem solving skills introduced in this course will help the students derive novel insights from their business problems.

## Course Objectives:

After taking this course, the students are expected to:

- Have a good understanding of the basics of machine learning and its application to business problems and business data sets
- Have the insight to become involved in more complex AI projects
- Understand the pros and cons of different techniques and their preferred business application scenarios

## Suggested Texts: (Not required)

James, G., Witten, D., Hastie, T., Tibshirani, R., \An Introduction to Statistical Learning: with Applications in R", Springer, 2013 (main text).

URL (E-book):

<https://goo.gl/8NYEo4>

(Deep Learning) Goodfellow, Ian, Bengio, Yoshua, and Courville, Aaron, \Deep learning", MIT press, 2016.

URL (E-book):

<https://www.deeplearningbook.org>

## Homework and final project:

The individual homework will be written reports with corresponding Python codes. The group homework, midterm project, and final project will be presentations, accompanying written reports and Python codes. The reports are due on iCollege by 6:00 p.m Wednesdays, and one submission per team. The presentations need all students to attend, and will integrate both big data analysis and the communication of important results.

## Grading:

60 % Homework

20 % Midterm project

20 % Final project

## Grading Scale:

97-100 A+	87-89 B+	77-79 C+	60-69 D
93-96 A	83-86 B	73-76 C	59 and below F
90-92 A-	80-82 B-	70-72 C-	

## Group Management:

On the first day of class, groups will be assigned. If there are problems during the semester, here is how it is going to work.

### *Terminating team members*

As in any organization there may be people in your group who are not willing or able to perform to the level of excellence demanded by the organization. Most organizations have a defined process to handle such possibilities. Your team is responsible for managing, monitoring, and improving team member performance. Your group will employ a process that requires team members to take initiative and to remain in charge of the management of fellow team members. This process will enable team members every chance to improve their own performance. It also will provide individual team members with the opportunity to appeal any disciplinary steps taken against them to the CEO of the company (the faculty).

The process used to improve team member performance and/or to terminate a team member's membership in the team will involve the following steps:

- Discuss the poor performance with the individual and the standards he or she is expected to meet. Seek a commitment from the individual to improve and to meet the expectations of the team.
- If the poor performance does not improve, discuss the situation again and ask the individual to document the discussion including their understanding of the standards of performance and their shortfalls from those standards. The document should describe what the individual must do to meet those standards and the time frame in which the individual will come up to the standards. This agreement should be written and signed by all team members, and a copy should be sent to the CEO.
- If the agreement is not met, the team, including the individual in question, will schedule a meeting with the CEO. The team will bring a copy of the contract to the meeting for the CEO and will discuss the individual's performance with the CEO. The individual will be terminated or given a final chance to improve his or her performance during that meeting and within a given time frame.
- If the performance does not improve within the time frame, the individual will be terminated from the team.
- If the individual is terminated, the individual may seek employment with another team. Alternatively, he or she must complete all course work in its entirety by himself or herself

### *Resigning from a team*

A student may resign from a team and switch to a different one. The work that was done while a team member is the property of both the team and the individual so all can use the work product. A hiring process will be used to facilitate the placement of the resigning person on a different team.

### *Group participation evaluation*

At the end of the semester, you will complete an evaluation of your teammates' participation in the group. You must complete this evaluation in order to receive any points for your own group participation grade.

## Course Policies:

**iCollege and email.** Lectures, examples, announcements, etc. will be posted on iCollege. Students are responsible for all announcements posted on iCollege and made in class. Email communications will be sent to the GSU student email account listed on GoSOLAR and registered via iCollege. Students are responsible for all announcements made by email. If you do not regularly check your GSU student email, forward it to an account that you check regularly. Note: Do not use the email in iCollege to communicate with the faculty. This email can only be accessed through iCollege and will not reach us efficiently. Please send email to [ywang159@gsu.edu](mailto:ywang159@gsu.edu).

**Piazza:** Students are encouraged to post and answer homework questions on piazza. The link is: <https://piazza.com/class/ky8axoi5wox2fv>

**Attendance:** Attendance at all class meetings is expected. Some classes involve substantial time for group work and team presentations, including some graded presentations. Missed classes will result in points lost for those grades.

**Late Work and Make-Up Policy:** Any request to submit late or make-up work must be accompanied by sufficient documentation of the reason for the request. It is at the faculty's discretion whether to accept late or make-up work. Requests for extensions or make-up work should be made prior to the missed deadline or class, to the extent possible.

**Ethics and Academic Honesty:** This is the general rule in the graduate program. We encourage you to share your work and knowledge, but draw the line at plagiarism and copying the work of others. Work with other students or seek assistance from another person only is specifically allowed. If you are allowed to work with another student (or anyone) on an assignment, acknowledge the collaboration. Never copy another student's work or allow another student to copy your work. Do not use any prohibited materials. *In this class most of the work will be collaborative, but please note that if the professor asks for a student to hand in their own work product—it should be the student's own work and not copied from another.* We take issues of academic honesty very seriously. Students are expected to recognize and uphold standards of intellectual and academic integrity in all work. The university assumes as a basic and minimum standard of conduct in academic matters that students be honest and that they submit for credit only the products of their own efforts. The University policy on academic dishonesty is spelled out in Section 1350 of the Graduate Catalog.

The following are instances of academic dishonesty:

- Plagiarism (see Section 1350 of the Graduate Catalog.)
- Cheating on examinations,
- Unauthorized collaboration with others
- Falsification of materials
- Multiple submissions (i.e., submitting the same work for credit in more than one class).

Lack of knowledge is not an acceptable defense to any charge of academic dishonesty. Infractions will result, at a minimum, in a zero for the assignment and can result in expulsion from the university.

**Accommodations Statement:** Students who wish to request accommodations for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services, of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which an accommodation is sought.

**Student Course Evaluations:** Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation.

## Course Schedule

Please note that this syllabus is a guide and deviations may and will most likely be necessary.

CLASS	TOPIC AND COURSE CONTENT
Session 1	Introduction to machine learning and foundations: why machine learning in business?
Session 2	Linear regression and prediction.
Session 3	More on Linear regression and extensions.
Session 4	Classification (logistic regression, KNN, LDA, QDA.
Session 5	More on classification, support vector machine
Session 6	Bootstrap, Cross Validation and model selection to identify the key business factors

Session 7	Interpretability of business models: random forests and decision trees, predicting user signups.
Session 8	Midterm Exam
Session 9	Deep Learning (Neural Network).
Session 10	Deep learning and image analytics, object detection, recommendation systems Session
Session 11	Recurrent neural network in Deep Learning
Session 12	Text mining in Deep learning
Session 13	Reinforcement learning in Deep learning
Session 14	Overview of the material
Session 15	Final Presentation