

MA5771

Applied Generalized Linear Models

College of Science and Arts

INSTRUCTOR INFORMATION

Kui Zhang, PhD, Professor

Office Location: **Fisher 211**

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Office Hours: **M (11:30AM - 1 PM ET); F (11:30 AM to 1 PM ET); by appointment**

COURSE IDENTIFICATION

Course Number: **MA5771**

Course Name: **Applied Generalized Linear Models**

Course Location: **Online**

Prerequisites: **MA3740, MA4710, MA4720, or MA4780**

COURSE DESCRIPTION

The course covers construction, evaluation, and application of generalized linear models (GLMs) for analysis of different types of data. Topics include theories of structure, estimation, statistical inference including confidence interval and hypothesis testing, and diagnostic of generalized linear models, binomial GLMs such as logistic regression for modeling proportions, Poisson and negative binomial GLMs for modeling counts, Gamma and inverse Gaussian GLMs for modeling positive continuous data, and Tweedie GLMs.

COURSE RESOURCES

Course Website(s)

- Canvas - www.courses.mtu.edu

Required Course Text

- Generalized Linear Models with Examples in R, 1st edition, by Peter K. Dunn and Gordon K. Smyth. Copyright©2018, Springer. ISBN-10: 1441901175; ISBN-13: 978-1441901170.
- Most of data set are in R software package **GLMsData**. Other data sets not in **GLMsData** are described in each week's contents and can be found through the **Files** tab, within the **Data-Files** folder on the course canvas.

Additional Useful References:

- Extending the Linear Model with R: Generalized Linear, Mixed Effects and Nonparametric Regression Models, 2nd edition, by Julian J. Faraway, Copyright ©2016, Chapman and Hall/CRC. ISBN-10: 9781498720960, ISBN-13: 978-1498720960.
- An Introduction to Generalized Linear Models, 2nd edition, by Annette J. Dobson and Adrian G. Barnett, Copyright ©2018, Chapman and Hall/CRC. ISBN-10: 1138741515, ISBN-13: 978-1138741515.

Required Statistical Software: R

- Download R from [The Comprehensive R Archive Network](https://www.R-project.org/)
- [R studio](https://www.rstudio.com/) is a convenient addition to R, but not a required software for this course.
- R programs for all examples and all exercise problems can be accessed through the **Files** tab, within the **R-Files** folder on the course canvas.

STUDENT SUCCESS ADVISOR

TBA

Email: TBA

- **Phone:** TBA
- **Text:** TBA

COURSE LEARNING OBJECTIVES

Upon successful completion of this course, students will be able to:

- describe basic concepts and theory of generalized linear models in mathematical forms, including but not limited to distributions, maximum likelihood estimation, link functions, and test statistics, etc.
- construct appropriate generalized linear model(s) for the analysis of a given data.
- perform corresponding model fitting, hypothesis testing, and model diagnostic for generalized linear models using R.
- interpret analytical results from generalized linear models appropriately.

GRADING SCHEME

Letter Grade	Percentage	Grade Points	Rating
A	90% & Above	4.00	Excellent
AB	85% - 89.99%	3.50	Very Good
B	80% - 84.99%	3.00	Good
BC	75% - 79.99%	2.50	Above Average
C	70% - 74.99%	2.00	Average
CD	65% - 69.99%	1.50	Below Average
D	60% - 64.99%	1.00	Inferior
F	59.99% and below	0.00	Failure

I - Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student's control.

X - Conditional, with no grade points per credit; given only when the student is at fault in failing to complete a minor segment of a course, but in the judgment of the instructor does not need to repeat the course. It must be made up by the close of the next semester or the grade becomes a failure (F). An (X) grade is computed into the grade point average as a (F) grade.

Grading Policy

Grades will be based on the following:

Homework	45%
Quizzes	15%

Final Exam	25%
Final Project	15%
Total	100%

Late Assignments

Late submissions of homework or the exam will not be accepted, nor will extensions be granted for homework or the exam. There may be rare exceptions allowed for late submission on an individual basis, provided that this is worked out in advance with the instructor. All due dates for homework and exams have been provided to you at the beginning of the term, so please plan accordingly.

COURSE POLICIES

Homework (Week 1 to Week 7)

There will be a homework assignment for each week. Homework can be written or typed and must be submitted to the course canvas system. Late submissions of homework will not be accepted, nor will extensions be granted for homework. There may be rare exceptions allowed for late submission on an individual basis, provided that this is worked out in advance with the instructor. (Homework in Week 7 is optional and students can earn some bonus points.)

Quizzes (Week 0 to Week 6)

There will be one graded quiz in Week 0.

There will be two graded quizzes in each week from Week 1 to Week 6.

Final Exam (Week 7)

The final exam will be available Days 5-7 of week 7. The exam will be open notes and will cover all topics taught in this course. You will have four hours to complete the final exam.

Late submissions of the exam will not be accepted nor will extensions be granted, so please plan accordingly!

Final Project (Week 5 to Week 7)

From Week 5, you will be assigned a final project and you have three weeks to: (1) find a data set; (2) perform the appropriate analysis; (3) prepare a final report. The specific requirements can be found in the course contents.

Collaboration/Plagiarism Rules

Proper professional and ethical behavior is expected of all students in this class. This is taken very seriously. If cheating is confirmed, a score of zero will be given for the homework/exam. At my discretion, the Dean of Students will be notified.

On all homework, you are encouraged to have discussions with classmates. This is not considered cheating as long as you write your own answers. Having someone else do the work for you or copying the work of another is cheating.

On all quizzes and exams, I expect you to work on your own. You are not allowed to discuss exams with anyone but the instructor. Keep in mind that intentionally or knowingly giving or receiving aid is considered as academic dishonesty.

Netiquette

Good communication is key in an online course. You will be participating in online discussion boards, as well as communicating with your instructors and fellow students directly through email, chat, and other online communication tools. For the most part, online etiquette, or netiquette, is similar to etiquette in a face-to-face classroom. The main difference is the lack of auditory and visual cues that often provide us with additional information.

Communication Policy

I generally strive to respond to individual messages within 24 hours of receipt (or up to 48 hours during weekends). As much as possible, please use the Canvas Inbox for individual correspondence. Communication to the class will be delivered via Announcements on the course Canvas, and you are expected to check in on Canvas regularly (you are encouraged to set your Canvas notifications to receive alerts from the course Canvas page). Feedback on assignments will be delivered via the Canvas Grades tool. Grades and feedback are provided within a week for regular weekly assignments and within two weeks for Major assignments or course projects.

ACADEMIC INTEGRITY RULES

Students may discuss homework assignments, but are expected to individually work/write/solve any and all submitted work. All authorized resources used, including but not limited to internet sites (e.g. Chegg, Study Soup, Course Hero, etc.), should be appropriately cited. Because it's important to everyone at Michigan Tech that academic standards be maintained, academic misconduct may result in an appropriate conduct sanction/educational condition(s) imposed by the Office of Academic and Community Conduct and/or in an academic penalty (lower grade/failing grade) imposed by the faculty.

For more details on academic integrity, please check the [Academic Integrity Policy of Michigan Tech.](#)

UNIVERSITY POLICIES

Student work products (exams, essays, projects, etc.) may be used for purposes of university, program, or course assessment. All work used for assessment purposes will not include any individual student identification.

Michigan Tech has standard policies on academic misconduct and complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. For more information about reasonable accommodation for or equal access to education or services at Michigan Tech, please call the Dean of Students Office (906) 487- 2212 or go to University Policies for Course Syllabi.

COURSE SCHEDULE

LIBRARY

Many useful resources are available at the [J. Robert Van Pelt and John and Ruanne Opie Library.](#)

TECHNICAL SUPPORT

[Michigan Tech IT](#) is available Monday - Friday from 8:00 am - 5:00 pm Eastern Time.

Additionally, support can be obtained from [Michigan Tech's Support Channels.](#)

You can Email Michigan Tech IT directly at it-help@mtu.edu.