# Banner Image (no picture) with the text Oregon State University Ecampus Syllabus

## Course Name: Time Series Analytics

## Course Number: ST 566

## Credits: 3

## Instructor name: Dr. Lan Xue

Instructor email:[xuel@oregonstate.edu](mailto:xuel@oregonstate.edu)

## Prerequisite

ST 516 [C] and ST 517 [C] and ST 518 [C] and /or equivalent.

CommunicationPlease post all course-related questions in the Q&A Discussion Forum so that the whole class may benefit from our conversation. Please contact me privately for matters of a personal nature. I will reply to course-related questions within 24 hours. I will strive to return your assignments and grades for course activities to you within five days of the due date.

## Time Expectations

This course combines approximately 90 hours of instruction, online activities, and assignments for 3 credits.

Technical AssistanceIf you experience any errors or problems while in your online course, contact 24-7 Canvas Support through the Help link within Canvas.  If you experience computer difficulties, need help downloading a browser or plug-in, or need assistance logging into a course, contact the IS Service Desk for assistance. You can call (541) 737-8787 or visit the [IS Service Desk](https://oregonstate.teamdynamix.com/TDClient/Requests/TicketRequests/NewForm?ID=Dr9c0T7BaSI_) online.

## Course Content

ST566D aims to learn and apply Statistical methods for the analysis of data that are observed sequentially over time. The main challenge is to account for the serial correlation in the data. Topics include:

* Descriptive techniques for time series: trend, seasonality, autocorrelation and correlogram;
* Time series models: MA, AR, ARMA, ARIMA and SARIMA models;
* Estimation in the time domain;
* Forecasting; exponential smoothing; forecasting from ARIMA models;
* Time series regression models;
* Spectral analysis of time series.

## The focus will be on applied problems, though some mathematical statistics is necessary for a solid understanding of the statistical issues. In addition, Statistical Software R will be used to illustrate and implement above statistical methods.

## Measurable Student Learning Outcomes

The students are expected to learn fundamental statistical methods to analyze time series data and be able to carry these analyses in statistical software R. The students should be able to present and summarize the time series in an informative way, to appropriately model and analyze the correlation structure of the time series in both time and frequency domains, to perform prediction using appropriate time series models.

Learning Resources

This course is composed of 10 week-long modules. The **learning materials** for a module consist of:

* **Readings** (A reading list will be provided at the start of each module).
* **Lectures** Narrated Adobe Presenter lectures (slides with a voiceover) that cover the topics for the week and important concepts from the readings.
* **Computer lab** R programming instructions to teach you how to perform statistical analysis of survival data in statistical software R.

Within each module, you need to complete the following **learning assessments:**

* two discussion board posts,
* one quiz (every other week),
* one homework assignment.

The last module is different that there is no homework, and instead you will work on your final project.

## Topic Schedule

|  |  |
| --- | --- |
| **Week** | **Topic** |
| 1 | Introductions to time series analysis; decomposition of time series; |
| 2 | Exploratory time series analysis |
| 3 | Introduction to time series models, stationarity |
| 4 | ARMA models |
| 5 | Estimation of ARMA models |
| 6 | Fitting ARMA models and Forecasting |
| 7 | ARIMA and SARIMA models |
| 8 | Exponential smoothing and regression models |
| 9 | Spectral analysis |
| 10 | Wrap up and case studies |

## Assigned Readings

A reading list will be provided at the start of each module. The following two textbooks are used for reading assignments.

1. Analysis of Time Series: An introduction. Chris Chatfield

[**https://ebookcentral.proquest.com/lib/osu/detail.action?docID=199099**](https://ebookcentral.proquest.com/lib/osu/detail.action?docID=199099)

1. Time Series Analysis: with applications in R. Jonathan D. Cryer and Kung-Sik Chan

<https://link-springer-com.ezproxy.proxy.library.oregonstate.edu/book/10.1007%2F978-0-387-75959-3>

## Evaluation of Student Performance

* Discussions – 100 points
* Quizzes – 100 points
* Homework – 180 points
* Final Project – 100 points
* **Total – 480 points**

## Grading Scale

Final percentages will be converted to letter grades according to the following scheme.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percent** | **Grade** |  | **Percent** | **Grade** |
| 95-100 | A |  | 65-69.9 | C+ |
| 88-94.9 | A- |  | 60-64.5 | C |
| 80-87.9 | B+ |  | 55-59.9 | C- |
| 75-79.9 | B |  | 45-54.9 | D |
| 70-74.9 | B- |  | 0-44.9 | F |

Discussion Participation

Students are expected to participate in all graded discussions. While there is great flexibility in online courses, this is not a self-paced course. You will need to participate in our online discussions at least two different days each week, with your first post due no later than Wednesday midnight, and your second post due by Friday midnight. Your discussion posts will be graded according to the following scale (5 maximum points for each discussion question).

|  |  |  |  |
| --- | --- | --- | --- |
| Criteria | Excellent | Acceptable | Poor |
| Meeting the deadline | The student made the required posts by the deadline set. (2) | The student made some of the required posts by the deadline set. (1) | The student did not post by the required deadline set. (0) |
| Quality of the post | The student has clearly thought about the discussion question and has raised interesting solutions and/or problems. (3) | The student has written about the discussion question but has not offered information that was not already given in the text. (2) | The student has not reflected on the discussion question, or the post made is irrelevant to the topic. (0) |

Late Policy

Late work in online courses is discouraged. The due date of each assignment is provided on canvas. For each module, the quiz is due by Friday midnight of the week and the homework assignment is due by Monday midnight of the following week. Assignments and quizzes submitted after the due date will receive a 10% deduction on the first day past the due date, a 50% deduction on the second day past the due date. Work submitted after two days past the original due date will not be accepted and receive a zero.

Proctored Exam

There are **no** proctored exams for this course.

Incompletes

Incomplete (I) grades will be granted only in emergency cases (usually only for a death in the family, major illness or injury, or birth of your child), and if the student has turned in 80% of the points possible (in other words, usually everything but the final paper). If you are having any difficulty that might prevent you completing the coursework, please don’t wait until the end of the term; let me know right away.

### Guidelines for a Productive and Effective Online Classroom (Adapted from Dr. Susan Shaw, Oregon State University)

Students are expected to conduct themselves in the course (e.g., on discussion boards, email) in compliance with the university’s regulations regarding civility.

Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to be expected. In all you say and do for this course, be professional. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor.

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:

* Unless indicated otherwise, please complete the readings and view other instructional materials for each week before participating in the discussion board.
* Read your posts carefully before submitting them.
* Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.
* Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.

### Statement Regarding Students with Disabilities

Accommodations are collaborative efforts between students, faculty, and [Disability Access Services (DAS)](http://ds.oregonstate.edu/home/). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.

### Accessibility of Course Materials

All materials used in this course are accessible. If you require accommodations, please contact [Disability Access Services (DAS)](http://ds.oregonstate.edu/home/).

Additionally, Canvas, the learning management system through which this course is offered, provides a[vendor statement](http://www.instructure.com/accessibility)certifying how the platform is accessible to students with disabilities.

## Expectations for Student Conduct

Student conduct is governed by the university’s policies, as explained in the Student Conduct Code (<https://beav.es/codeofconduct>). Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility.

### Academic Integrity

Integrity is a character-driven commitment to honesty, doing what is right, and guiding others to do what is right.  Oregon State University Ecampus students and faculty have a responsibility to act with integrity in all of our educational work, and that integrity enables this community of learners to interact in the spirit of trust, honesty, and fairness across the globe.

Academic misconduct, or violations of academic integrity, can fall into seven broad areas, including but not limited to: cheating; plagiarism; falsification; assisting; tampering; multiple submissions of work; and unauthorized recording and use.

It is important that you understand what student actions are defined as academic misconduct at Oregon State University.  The OSU Libraries offer a [tutorial on academic misconduct](https://guides.library.oregonstate.edu/c.php?g=286121&p=3896378), and you can also refer to the [OSU Student Code of Conduct](https://beav.es/codeofconduct) and [the Office of Student Conduct and Community Standard’s website](https://studentlife.oregonstate.edu/studentconduct/student-info) for more information.  More importantly, if you are unsure if something will violate our academic integrity policy, ask your professors, GTAs, academic advisors, or academic integrity officers.

### Conduct in this Online Classroom

Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the [university's regulations regarding civility](http://oregonstate.edu/studentconduct/).

# Ecampus Reach Out for Success

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it’s important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about [resources that assist with wellness and academic success](https://counseling.oregonstate.edu/reach-out-success).

Ecampus students are always encouraged to discuss issues that impact your academic success with the [Ecampus Success Team](https://ecampus.oregonstate.edu/services/student-services/). Email [ecampus.success@oregonstate.edu](mailto:ecampus.success@oregonstate.edu) to identify strategies and resources that can support you in your educational goals.

## For mental health:

Learn about [counseling and psychological resources for Ecampus students](https://counseling.oregonstate.edu/main/ecampus-students). If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255).

## For financial hardship:

Any student whose academic performance is impacted due to financial stress or the inability to afford groceries, housing, and other necessities for any reason is urged to contact the Director of Care for support (541-737-8748).

**Tutoring and Writing Assistance**

TutorMe is a leading provider of online tutoring and learner support services fully staffed by experienced, trained and monitored tutors. Access TutorMe from within your Canvas course menu.

The Oregon State [Online Writing Suite](http://writingcenter.oregonstate.edu/online-writing-lab) is also available for students enrolled in Ecampus courses.

**Academic Calendar**

All students are subject to the registration and refund deadlines as stated in the Academic Calendar: <https://registrar.oregonstate.edu/osu-academic-calendar>.

OSU Student Evaluation of Teaching

During Fall, Winter, and Spring term, the online Student Evaluation of Teaching system opens to students the Wednesday of week 8 and closes the Sunday before Finals Week. Students will receive notification, instructions and the link through their ONID email. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to “sign” their comments, agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor.  Anonymous (unsigned) comments go to the instructor only.