# STAT 453/553: Introductory Biostatistics Syllabus
# Spring 2023

**Overview**

This course provides an overview of statistical methodology useful in the practice of modern biostatistics. There are two major topics covered in the course at an introductory level: biostatistics for epidemiology and clinical trial design. More specific topics are listed in the attached daily syllabus.

**Time:    Tuesday and Thursday   4:00PM - 5:15PM TR BRC 284**

**Instructors:** There are two primary instructors for the course. Each instructor will cover about 7 weeks of the course. Dr. Suyu Liu will cover biostatistics, and Dr. Ying Yuan will cover clinical trials.

| **Instructor:** | Suyu Liu | Ying Yuan |
|---|---|---|
| **Email:** | syliu@mdanderson.org | yyuan@mdanderson.org |
| **Voice:** | 713-563-4280 | 713-563-4271 |

**Teaching Assistant**:

| TBD | | |
|---|---|---|

**Textbooks:**

- **Statistics for Epidemiology**, by Nicholas Jewell. Publisher: Chapman & Hall/CRC

- **Model-Assisted Bayesian Designs for Dose Finding and Optimization**, by Ying Yuan, Ruitao Lin and Jack Lee. Publisher: Chapman & Hall/CRC

**Software:        R package (can be downloaded from https://www.r-project.org/)**

**Homework:** Each of the two major parts will include approximately 2-3 assignments, at least one of which will be data based. All students are required to complete the assignments. Homework will be submitted at the beginning of class on the due date. If circumstances beyond the student's control arise and an assignment cannot be submitted on the due date, an instructor should be contacted prior to the due date. With an instructor's permission, late homework may be accepted within one week of the due date. All decisions will be made on an individual student basis and the final decision rests with the instructor assigning the homework. **A penalty of 10 percentage points will be applied to late homework.**

**Website:** http://odin.mdacc.tmc.edu/~yyuan/ has more information about the Biostatistics part of the course and datasets for the homework.

**Examinations:** There will be one in-class exam and one final project in the course.

**Course Grade:** The material covered in the classroom serves two different course, STAT 453 (undergraduate) and 553 (graduate). Although the lectures will cover the same material for both courses, those enrolled in STAT 553 will be required to answer either additional questions or more challenging questions on the both the homework assignments and in-class quizzes. Although the requirements for the two courses are the same, different grading scales will be applied to the two courses according to their relative level. Both courses will be graded on the following component basis.

| Component | % |
|---|---|
| Homework | 50 |
| Midterm Exam | 30 |
| Final project | 20 |

**Disability Statement**

Any student with a disability requiring accommodations in this course is encouraged to contact me after class or during office hours.  Additionally, students will also need to contact Disability Support Services in the Ley Student Center.

**TENTATIVE DAILY SYLLABUS**

| Week | Date | | Topic | Readings* | Instructor |
|---|---|---|---|---|---|
| *1* | 1/10 | Tue | Introduction | SE: 1, 2 | Liu |
| | 1/12 | Thu | Study Design | SE: 3, 5 | Liu |
| *2* | 1/17 | Tue | Disease-Exposure Association | SE: 4 | Liu |
| | 1/19 | Thu | Contingency Tables: Association | SE: 6 | Liu |
| *3* | 1/24 | Tue | Contingency Tables: Confounding | SE: 9 | Liu |
| | 1/26 | Thu | Contingency Tables: Interaction | SE: 10 | Liu |
| *4* | 1/31 | Tue | Logistic Regression: introduction | SE: 12 | Liu |
| | 2/2 | Thu | Logistic Regression: estimation | SE: 13 | Liu |
| *5* | 2/7 | Tue | Logistic Regression: diagnosis | SE: 13 | Liu |
| | 2/9 | Thu | **Spring Recess** | | |
| *6* | 2/14 | Tue | Matched studies | SE: 16 | Liu |
| | 2/16 | Thu | Matched studies | SE: 16 | Liu |
| *7* | 2/21 | Tue | TBA | | Liu |
| | 2/23 | Thu | **Midterm Exam** | | Liu |
| *8* | 2/28 | Tue | Introduction to clinical trials | | Yuan |
| | 3/2 | Thu | Introduction to clinical trials | | Yuan |
| *9* | 3/7 | Tue | Bayesian statistics | MA: 1 | Yuan |
| | 3/9 | Thu | Bayesian statistics | MA: 1 | Yuan |
| *10* | 3/14 | Tue | **Spring Break** | | |
| | 3/16 | Thu | **Spring Break** | | |
| *11* | 3/21 | Tue | 3+3 design, CRM | MA: 2 | Yuan |
| | 3/23 | Thu | BMA-CRM | MA: 2 | Yuan |
| *12* | 3/28 | Tue | Bayesian optimal interval design | MA: 3 | Yuan |
| | 3/30 | Thu | Drug combination trials | MA: 4 | Yuan |
| *13* | 4/4 | Tue | Handle late-onset toxicity | MA: 5 | Yuan |
| | 4/6 | Thu | Finding optimal biological dose | MA: 8 | Yuan |
| *14* | 4/11 | Tue | Phase II trial design | | Yuan |
| | 4/13 | Thu | Basket trial design | | Yuan |
| *15* | 4/18 | Tue | **Final project presentation** | | Yuan |

| | 4/20 | Thu | **Final project presentation** | | Yuan |
|---|------|-----|--------------------------------|---|------|

\*SE: Statistics for Epidemiology

\*MA: Model-Assisted Bayesian Designs for Dose Finding and Optimization