# ECE452/552
# Control Systems Design II
# (Winter 2020)

**Instructor:** R. Tymerski, FAB160-18, tymerski@ee.pdx.edu

**Office Hours:** see https://www.pdx.edu/ece/faculty-office-hours

**Text:** "True Digital Control", by K. James Taylor, Peter C. Young and A. Chotai. John Wiley.

Students should download this textbook for free from the Wiley website.

**Notes:** A set of notes and other materials used by the instructor is available on the web at: http://web.cecs.pdx.edu/~tymerski/

**Aim:** The aim of this class is to primarily introduce students to a recent methodology for discrete time controller design. In this design methodology a non-minimally sized state vector is used comprised of the system current and delayed input and output signals. This approach obviates the need for an observer. Therefore an LQR (Linear Quadratic Regulator) design may be straightforwardly applied to a system. The instructor believes this approach is not only much simplified than former approaches but also highly practical.

Accordingly this is a projects based class. So you will gain experience with practical implementation. Use of simulation tools such as Simulink will also be made. We will use the example system presented in the ECE451/551 class and design and build a controller.

To highlight the differences with a continuous time design approach students will add some finishing touches to the design tackled in the ECE451/551 class. This should be completed within the first two weeks of the term. This is referred to as Project #1 below. Project #2 will involve a digital controller design based on the non-minimum state concept. A suitable choice of micro-controller will need to be made early in the term. Performance between the two different types of controllers will be compared.

**Grading:**

There are no exams or quizzes.

- Project with Report #1 30%
- Project with Report #2: 70%

The reports are to be written in the form of a technical paper.

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**Note**: On occasion the instructor may need to communicate with the whole class or specific members of the class via the email address the student specified during registration. It is the student's responsibility to keep this address updated.