# The University of Texas at Dallas
# Department of Electrical Engineering

# EE 4340/ EECT 5340 Analog Integrated Circuit Analysis and Design

## Course Information:

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| Course Instructor: | Dr. Dongsheng Brian Ma<br>Office: ECSN 3.604<br>Office Phone: (972)883-5558<br>Email: d.ma@utdallas.edu |
| Teaching Assistant: | TBA |
| Lecture Time: | MW 11:30am-12:45pm |
| Location: | CB3 1.312 |
| Office Hours: | T 10:00am−12:00pm @ECSN 3.604, or by appointment |
| TA Office Hours: | TBA |
| Textbook: | Fundamentals of Microelectronics by B. Razavi (Wiley, 1st Edition), ISBN 978-0-471-47846-1. |
| References: | On-line class notes;<br>Design of Analog CMOS Integrated Circuits by B. Razavi, McGraw-Hill, ISBN: 0072380322;<br>Analysis and Design of Analog Integrated Circuits, by P. Gray, P. J. Hurst, S. H. Lewis, and R. Meyer, John Wily & Sons, Inc., 5th edition, ISBN: 0470245999;<br>*HSPICE Manuals* (http://www.ee.washington.edu/class/cadta/hspice/). |
| Prerequisites: | EECE 3311 or equivalent |
| Class Website: | www.utdallas.edu/~d.ma/4340.htm |

## Course Objectives:

To provide principles of analog integrated circuit analysis and design knowledge, which are required in analog IC design industry and research. Contents of the class include large and small signal behavior of MOS transistors, single-stage amplifiers, differential amplifiers, current mirrors, amplifier basics, input offset voltage and feedback, and the introduction to most useful analog circuit blocks design.

## Course Learning Outcomes:

For EE4340:

- Ability to analyze large-signal and small-signal characteristics of single-stage amplifiers intuitively
- Ability to analyze and design current mirrors
- Ability to analyze and design differential amplifiers
- Ability to analyze frequency response of amplifiers
- Ability to understand and analyze feedback topologies

For EE5340:

- Ability to understand and apply MOSFET and BJT large-signal and small-signal device models
- Ability to analyze large-signal and small-signal characteristics of single-stage amplifiers intuitively
- Ability to analyze and design current mirrors
- Ability to analyze and design differential amplifiers
- Ability to analyze frequency response of amplifiers
- Ability to understand and analyze feedback topologies
- Ability to design and characterize simple amplifiers according to design specifications in Cadence CAD software

## Evaluation:

For EE4340:

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| Homework | 25% |
| Exams | 60% (67.5%; 22.5% each) |
| Quizzes & Professionalism | 15% (7.5%; 4% for Q and 3.5% for P) |

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|---|---|---|
| For EE5340: | Homework | 25% |
| | Exams | 48% (54%) |
| | Final Project | 12% (15%) |
| | Quizzes & Professionalism | 15% (6%; 3% for Q and 3% for P) |

Homework:

In general, homework will be assigned on a bi-weekly basis and be collected at the beginning of the class on the due date (except in-class homework). You will be given at sufficient time to complete each home, so **no late submission is allowed.** The due date of each homework will be specified when the homework is announced. The homework solution will be posted on class website provided in "course information" section of this syllabus, with password protection.

Final Project (for 5340 students only):

For graduate students, another target of our class is to reinforce the independent research ability. The students need to finish one project which covers key circuit design concepts and techniques taught in this class. To accomplish the project, the students need to fulfill a complete engineering design process, including project analysis and planning, system definition, circuit design, simulation and verification as well as project reporting.

Exams:

All exams are closed-book, closed-notes with one-page, letter-size, single-side formula sheet allowed. Calculators cannot be used in the programmable mode in the exam.

Quizzes & Professionalism:

There will be several short quizzes to be conducted in class. In general, the questions in a quiz are fundamental and directly related to the class material that has been recently covered. The purpose of the quizzes is to help the students further understand the class materials with active classroom participation. A quiz is usually conducted in class either before or after a lecture session.

The professionalism portion of your grade will basically depend on your adherence to the course policies outlined in this document. Smoking, drinking and eating is prohibited in the classroom by the University rules. Please switch off your cell phones during the class. Attendance is important, since each student is responsible for all announcements and materials covered in each class. You punctual arrival will be appreciated. If you cannot attend some classes for acceptable reasons such as illness or business, official written certificate is required to submit in advance.

## Code of Academic Integrity:

Violations of this code can lead to sanctions and even expulsion from the University. The guiding principle is that submitted work must be the student's own. However, the complete implications of the code are explained on the University's web page at: http://www.utdallas.edu/dishonesty/UTDdishonesty-facultyguide.html

## Withdrawals:

If you wish to withdraw, correct procedure must be followed. Simply stopping attendance does not drop you from the course. If you do not withdraw according to procedure, your name will appear on the final grade report with a failing grade.

## Incompletes:

A course grade of "incomplete" (I) can be awarded only in cases of documented hardship, such as a medical or family emergency.

## Important Dates:

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| First/last day of the classes | Aug. 26, 2013/Dec. 11, 2013 |
| Labor Day | Sept. 2, 2012 |
| Thanksgiving holidays | Nov. 28-30, 2012 |

## Class Survey

**Your inputs will help us optimize class syllabus based on your needs and background.**

**What is your circuit design background? (any circuit classes you have taken? Lab experiences on circuit design? Design tools such as PSpice? HSpice? Cadence? Silicon chip tape-out experiences?, etc..)**

**What do you expect to learn in the class?**

**What do you suggest to modify in order to improve our syllabus?**

**Your name (Optional) _____**