جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

# Course Syllabus: Monolithic Amplifier Circuits - EE 202

| | |
|---|---|
| **Division** | Computer, Electrical and Mathematical Sciences & Engineering |
| **Course Number** | EE 202 |
| **Course Title** | Monolithic Amplifier Circuits |
| **Academic Semester** | Spring |
| **Academic Year** | 2018/2019 |
| **Semester Start Date** | 01/27/2019 |
| **Semester End Date** | 05/23/2019 |
| **Class Schedule** (Days & Time) | 05:00 PM - 08:00 PM \| Tue |

## Instructor(s)

| Name | Email | Phone | Office Location | Office Hours |
|---|---|---|---|---|
| Khaled Nabil Salama | khaled.salama@kaust.edu.sa | +966128084420 | 3277, 3, Ibn Sina (bldg. 3) | 3-5pm Tuesday |

## Teaching Assistant(s)

| Name | Email |
|---|---|
| TBD | TBD |

## Course Information

| | |
|---|---|
| **Comprehensive Course Description** | This course covers the design, construction, and debugging of monolithic amplifier circuits. The main contents are: the basic principles of operation, terminal characteristics, and equivalent circuit models for transistors and op-amps. Design and analysis of multistage analog amplifiers, differential amplifiers, and current mirrors. Frequency response of cascaded amplifiers and gain-bandwidth considerations. Feedback, stability and Noise analysis.<br>Design and Simulation exercises are significant components of the course. |
| **Course Description from Program Guide** | This course covers principles of designing and optimizing analog and mixed-signal circuits in CMOS technologies, including an overview of device physics of the MOS transistor, small and large signal models, Analysis and design of CMOS multi-transistor amplifiers, feedback theory and application to feedback amplifiers, Stability considerations, pole- zero cancellation, root locus techniques in feedback amplifiers, and noise analysis. |
| **Goals and Objectives** | After completing this course, the student should have a firm grasp on:<br>•The concepts, the models, the use and the analysis of<br>1. MOS transistors in different circuits and applications<br>2. Single stage and two stage op-amps in different circuits and applications<br>•Amplifier stability, feedback, frequency response and compensation |
| **Required Knowledge** | Familiarity with Transistors: models, small signal analysis and circuit simulation. |

| | |
|---|---|
| **Reference Texts** | Microelectronic Circuits, Razavi<br>Design of Analog CMOS Integrated Circuits, Razavi |
| **Method of evaluation** | **20.00**% - Exam 2<br>**30.00**% - Homework /Assignments<br>**20.00**% - Exam 1<br>**30.00**% - Course Project(s) |
| **Nature of the assignments** | Homework assignments are due in the class.<br>The Solutions will be provided by the end of the day homeworks are due.<br>If you need more time for your homework, you have to inform the Instructor or the TA in advance.<br>Exams:<br>There will be two midterm exams and one final project<br>You are free to use your text book, course notes and any provided figures and handouts. |
| **Course Policies** | All homework assignments, quizzes, and exams are required. Students who do not show up for a Quiz or an exam should expect a grade of zero on that exam.<br>If you dispute your grade on any homework, quiz, or exam, you may request a re-grade (from the TA for the homeworks and quizzes or from the instructor for the exams) only within 48 hours of receiving the graded exam.<br>Incomplete (I) grade for the course will only be given under extraordinary circumstances such as sickness, and these extraordinary circumstances must be verifiable. The assignment of an (I) requires first an approval of the dean and then a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements. |
| **Additional Information** | Engineers are required to practice “continuous” or “life-long” learning. This course will cover a lot of material which will require the students to do a lot of self-study, reading of the textbooks and handouts, learning how to use equipment and software, etc…Although the instructor and the TAs are committed to help the students in this course, the students are also expected to take initiatives and to get used to this notion of self-study that will be anyway (i) expected form them in their future careers and (ii) imperative to their success and survival in the real engineering and academic worlds.<br>Please don’t hesitate to ask if you have any question or concern about the course. |

| Tentative Course Schedule<br>*(Time, topic/emphasis & resources)* | | |
|---|---|---|
| **Week** | **Lectures** | **Topic** |
| 1 | Tue 01/29/2019 | Introduction to MOSFET |
| 2 | Tue 02/05/2019 | Small signal Model |
| 3 | Tue 02/12/2019 | Gain Stages |
| 4 | Tue 02/19/2019 | MOSFET Amplifiers |
| 5 | Tue 02/26/2019 | Differential Amp. |
| 6 | Tue 03/05/2019 | Differential Amp. (2) |
| 7 | Tue 03/12/2019 | Differential Amp. (3) |
| 8 | Tue 03/19/2019 | Multistage Amp. |
| 9 | Tue 03/26/2019 | Multistage Amp. (2) |
| 10 | Tue 04/02/2019 | Multistage Amp. (3) |
| 11 | Tue 04/09/2019 | Frequency Response |
| 12 | Tue 04/16/2019 | Frequency Response (2) |
| 13 | Tue 04/23/2019 | Frequency Response (3) |
| 14 | Tue 04/30/2019 | Feedback |
| 15 | Tue 05/07/2019 | Feedback (2) |
| 16 | Tue 05/14/2019 | Noise in MOSFET |
| 17 | Tue 05/21/2019 | Final Review |

**Note**

The instructor reserves the right to make changes to this syllabus as necessary.