1. **Course number and name**
   EE 476/576: Design of Analog CMOS Integrated Circuits

2. **Credits and contact hours**
   3.0 (three lecture hours per week)

3. **Instructor's or course coordinator's name**
   Subhanshu Gupta

4. **Text book, title, author, and year**
   B. Razavi. 2016. *Design of Analog CMOS Integrated Circuits* (2nd ed.). ISBN-13: 978-0072524932; ISBN-10: 0072524936. McGraw Hill.
   Other supplemental materials
   P. Gray, P. Hurst, S. Lewis, and R. Meyer. 2009. *Analysis and Design of Analog Integrated Circuits* (5th ed.), Wiley & Sons, Inc.
   P. E. Allen and D. R. Holberg. 2012. *CMOS Analog Circuit Design* (3rd ed.). Oxford University Press. ISBN 978-0-19-976507-2.
   K. Martin and D. Johns. 2011. *Analog Integrated Circuit Design* (2nd ed.). Wiley & Sons, Inc.
   A. Hastings. 2005. *Art of Analog Layout* (2nd ed.). Prentice Hall.

5. **Specific course information**
   a. *Catalog description:* Analysis and design of linear integrated circuits in modern MOS and BJT technology; current mirrors, gain stages, operational amplifiers – single stage and two-stage, reference generation circuits, frequency response, and compensation. This is an elective in the microelectronics track.
   b. *Prerequisites or co-requisites:*
      By course: EE 311, 321 (or co-requisite), EE 489 (or corequisite).
      By topic: Basic circuit analysis, elementary electronics, p/n junction and transistor characteristics.

6. **Specific goals for the course**
   At the end of this course, students must be able to:
   - Analyze, design and simulate CMOS building blocks in particular for analog applications such as linear regulators, bandgap circuits, voltage- and current-references etc. (1a,1b, 1c, 1d, 1e, 2a, 2b, 2c)
   - Capable of operating industry-standard tools such as Cadence Spectre. (6a, 6b, 6c, 6d)
   - Map theoretical concepts into experimental designs in simulation environment. (1a, 1b, 1c, 1d, 1e, 6a, 6b, 6c)
   - Write a report on the design and test of the circuit. (3a, 3b, 3d, 3e)

7. **Brief list of topics to be covered**
   - Large signal behavior for semiconductor devices,
   - Semiconductor device models,

- Single-stage single-ended amplifiers,
- Single-stage differential amplifiers,
- Current mirrors,
- Operational amplifiers,
- Stability and frequency compensation,
- Noise in semiconductor devices and circuits,
- Feedback circuit analysis,
- Fully-differential operational amplifiers.