

# ECE 230L - LAB 4

## ELECTRICAL CHARACTERIZATION AND PARAMETER EXTRACTION OF METAL-OXIDE-SEMICONDUCTOR FIELD-EFFECT TRANSISTORS (MOSFET)

---

### Contents

1	Objectives of this Laboratory	2
2	Electrical Characterization of the MOS Field-Effect Transistor	2
	Grading Rubric	3

### List of Figures

## 1 Objectives of this Laboratory

The objectives of this laboratory session are as follows:

- to measure the NMOSFET drain-current characteristics  $I_D(V_{GS}, V_{DS})$  using LabVIEW,
- to extract the NMOSFET SPICE model parameters, and
- to evaluate the limitations of the electrical measurements and the simulation

## 2 Electrical Characterization of the MOS Field-Effect Transistor

## 3 Exploration

## 4 Questions

## Grading Rubric

Table 1: ECE 230L Laboratory 4 Grading Rubric

Criteria	Points Possible
<b>Raw Lab Data</b>	<b>15</b>
Circuit Diagram	3
$V_{DS \text{ source}}$ vs $I_{DS}$ , $V_{GS}$ plot	3
$V_{DS}$ vs $V_{DS \text{ source}}$ and $V_{GS}$ vs $V_{DS \text{ source}}$ plots	6
$I_{DS}$ vs $V_{GS}$ plot for $V_{DS} = 3V$	3
<b>Question 1</b>	<b>10</b>
<b>Question 2</b>	<b>10</b>
<b>Question 3</b>	<b>10</b>
<b>Question 4</b>	<b>10</b>
<b>Question 5</b>	<b>15</b>
Parameter extraction	10
% errors	5
<b>Question 6</b>	<b>10</b>
<b>Exploration</b>	<b>10</b>
Circuit Diagrams	5
Reasoning behind “mystery elements” order	5
<b>Quality of thought/analysis</b>	<b>10</b>
<b>Total</b>	<b>100</b>