** Place your pointer on the underlined fields and start typing to fill in text, ** or use an X or a number to fill in “check-box” or numbered fields.

Provide information requested below that is not contained in the syllabus. Please note the guidelines in the boxes.

Number (if known): ENGR 160    X    Undergraduate    ___ Graduate    ___ Professional

Title/subtitle: Smartphones, Tablets, and Wireless Networks: Understanding Electronics and Information Technology

Effective: Winter 2013  (Quarter and Year)

Offered: ___ Fall    ___ Winter    ___ Spring    ___ Summer    ___ Once Only    ___ Other ___

Instructor(s): ___

Hours per week per unit of credit may not be less than but may exceed those listed below.

- One unit for each hour per week (1:1) of colloquium, consultation, discussion, lecture, seminar, or workshop

- One unit for each three hours per week (1:3) of activity, clinic, extra reading, fieldwork, individual study, internship, laboratory, practicum, research (scheduled and outside), screening, term paper, thesis, tutorial, written work, and similar assigned problems

- One unit for each two to three hours per week (1:2-3) of studio

Units: 4

Activities and hours per week: Indicate below the number of hours per week that students will spend in the activities listed (leave blank those that do not apply).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Internship</th>
<th>___ Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinic</td>
<td>Laboratory</td>
<td>___ Studio</td>
</tr>
<tr>
<td>Colloquium</td>
<td>3 Lecture</td>
<td>___ Term Paper</td>
</tr>
<tr>
<td>Consultation</td>
<td>Practicum</td>
<td>___ Thesis</td>
</tr>
<tr>
<td>1 Discussion</td>
<td>Research (outside)</td>
<td>___ Tutorial</td>
</tr>
<tr>
<td>Extra Reading</td>
<td>Research (scheduled)</td>
<td>___ Workshop</td>
</tr>
<tr>
<td>Field</td>
<td>Screening (outside)</td>
<td>___ Written Work</td>
</tr>
<tr>
<td>Individual Study</td>
<td>Screening (scheduled)</td>
<td>___ Other:</td>
</tr>
</tbody>
</table>

Prerequisite(s): MATH 10A; and either CS 10 (or CS 10V) or EE 20 or ME 18
Read the guidelines in this box before writing the Catalog description.

Write the description in the present tense and limit it to 50 words (do not count grading information, repeatability information, or a list of E-Z subtitles). If possible, do not use complete sentences. However, use sentences that contain more than a list of items or topics.

Examples:
Instead of "This course will introduce students to the history of . . ., " use one of the following formats:
- Introduces the history of . . .
- An introduction to the history of . . .
- Introduction to the history of . . .

Instead of "Functions, equations, and graphs," use a format similar to one of the following examples:
- Explores functions, equations, and graphs . . .
- Topics include functions, equations, and graphs . . .
- A study of functions, equations, and graphs . . .


<table>
<thead>
<tr>
<th>Grading</th>
<th>Letter Grade or petition for Satisfactory/No Credit (S/NC)</th>
<th>Letter Grade only</th>
<th>In Progress (IP)</th>
</tr>
</thead>
<tbody>
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</table>

The statements selected below will be added to the Catalog description by the Catalog office:

Grading statement (if required):
- Satisfactory (S) or No Credit (NC) grading is not available.
- Graded Satisfactory (S) or No Credit (NC).
- Normally graded Satisfactory (S) or No Credit (NC), but students may petition the instructor for a letter grade on the basis of assigned extra work or examination.
- May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor.
- May be taken Satisfactory (S) or No Credit (NC) by students advanced to candidacy for the Ph.D.
- Students who submit a term paper receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.
- Students who present a seminar receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.
- Students who present a seminar or submit a term paper receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.
- Other: ___________

Repeatability statement (if required):
- Course is repeatable.
- Course is repeatable to a maximum of ___________ units.
- Course is repeatable as content changes.
- Course is repeatable as content changes to a maximum of ___________ units.
- Course is repeatable as topics change.
- Course is repeatable as topics change to a maximum of ___________ units.
- Other: ___________

If the course is repeatable, may a student take more than one section of the course in a single quarter? __ Yes __ No

Cross-listing statement: Cross-listed with ___________

Credit statement (to limit credit when course content overlaps):
Credit is awarded for only one of ___________
Other ___________

Breadth statement (for CPAC, ETST, FVC, HASS, or WMST courses only):
Fulfills the Humanities requirement for the College of Humanities, Arts, and Social Sciences.
Fulfills the Social Sciences requirement for the College of Humanities, Arts, and Social Sciences.
Fulfills either the Humanities or Social Sciences requirement for the College of Humanities, Arts, and Social Sciences.
See the Student Affairs Office in the College of Humanities, Arts, and Social Sciences.
Does not fulfill the Humanities or Social Sciences requirement for the College of Humanities, Arts, and Social Sciences.
Other: ___

If the course content overlaps or duplicates the content of another course, describe the overlap or duplication: ___

If the course affects degrees, minors, and/or programs, list the affected degrees, etc. and explain how they are affected: ___

If the course affects the prerequisites and/or descriptions of other courses, list the affected courses and explain how they are affected: ___

Justification for establishing the course (insert or attach):

Engineering optimization provides critical tools for engineers in almost any industry to design improved, more efficient systems at less cost. This course emphasize practical, real-world understanding of engineering optimization methodology and techniques relevant to engineering applications in design, operations, and analysis and problem-solving using MATLAB programming assignments. This course is useful to upper-level undergraduates students in all engineering disciplines.

Syllabus (insert or attach and include the information below): See attached

Course requirements (e.g., term papers and examinations)

If an activity selected above under “Activities and Hours” does not involve faculty contact (e.g., extra reading, individual study, and outside research), describe the activity and explain how it will be evaluated.

If one of the activities selected above is consultation hours, explain how these hours will be implemented and monitored.

For further information about course guidelines, see the General Rules and Policies Governing Courses of Instruction at senate.ucr.edu/Committees/courses/guidelines.pdf
ENGR 160  Introduction to Engineering Optimization Techniques  Syllabus

Instructor:

Dr. Hamed Mohsenian-Rad
Assistant Professor, Department of Electrical Engineering
Office: WCH 436
Email: hamed@ee.ucr.edu

Course Purpose:


Number of Hours:

Three hours lecture and one hour discussion.

Textbook:


Course Topics:

- Introduction to Optimization [Chapters: 1 and 2][Number of Hours: 3]:
  - Design Variables, Design Constraints, and Objective Function
  - Different Classifications of Optimization Problems
  - Single-Variable and Multi-Variable Optimization
  - Engineering Applications of Optimization: Chemical and Mechanical Processes, Circuit Design, Network Flow Problems, Supply Chain Management, etc.

  [Discussion Session: Formulating example optimization problems in engineering.]

- Linear Programming [Chapter: 3] [Number of Hours: 6]:
  - Standard form of a Linear Programming Problem
  - Geometry of Linear Programming Problems
  - Simplex Method
  - Engineering Applications of Linear Programming

  [Discussion Session: Using MATLAB to Solve Linear Programming Problems]
• Nonlinear Unconstrained Optimization [Chapters: 5 and 6] [Number of Hours: 9]
  o Elimination and Interpolation Methods
  o Direct Search Methods
  o Indirect Search (Descent) Methods
  o Gradient, Steepest Descent, and Newton Methods
  o Engineering Applications of Nonlinear Unconstrained Optimization

  [Discussion Session: Using MATLAB to Solve Nonlinear Unconstrained Problems]

• Nonlinear Constrained Optimization [Chapter 7] [Number of Hours: 9]:
  o Sequential Linear Programming
  o Feasible Directions Methods
  o Penalty Functions Methods
  o Gradient Projection Methods
  o Engineering Applications of Nonlinear Constrained Optimization

  [Discussion Session: Using MATLAB to Solve Nonlinear Constrained Problems]

Prerequisites:

MATH 10A; and either CS 10 (or CS 10V) or EE 20 or ME 18

Grading (Percentage):

  Homework – 15%
  MATLAB Assignment* - 10%
  Midterm Exam: 25%
  Final Exam – 50%

* The MATLAB assignments are submitted during the discussion sessions.