

ROWAN UNIVERSITY CURRICULUM PROPOSAL

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PROPOSAL TITLE: ELECTRONICS I (0909.311)

CHECK APPROPRIATE: UNDERGRADUATE GRADUATE 2 SEMESTER HOURS

SPONSOR(S): RAJ P. RAMACHANDRAN
JOHN L. SCHMALZL

DEPARTMENT/TELEPHONE # ELECTRICAL ENGINEERING X4643

CHECK ONE: COURSE MINOR PROGRAM CONCENTRATION SPECIALIZATION
 ACHIEVEMENT CERTIFICATE CERTIFICATION PROGRAM MAJOR PROGRAM

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| <p style="text-align: center;">Step #1 (Department)</p> <p><u>22 OCT 97</u> Approved (Date) <input type="checkbox"/> Not Approved (Date)</p> <p style="text-align: center;"><u>John Seiff</u> Dept. Curriculum Chr.</p> <p style="text-align: center;"><u>22 OCT 97</u> Reviewed (Date)</p> <p style="text-align: center;"><u>John Seiff</u> Dept. Chr.</p> | <p style="text-align: center;">Step #2 (Receipt)</p> <p style="text-align: center;">SCC# <u>97-98-182</u></p> <p style="text-align: center;"><u>10-24-97</u> Date Received Senate</p> <p style="text-align: center;">_____ Senate Curriculum Chr.</p> | <p style="text-align: center;">Step #3 (School)</p> <p style="text-align: right;">Reviewed Date: <u>22 OCT 97</u></p> <p><input checked="" type="checkbox"/> Recommend to Approved <input type="checkbox"/> Recommend NOT to Approve</p> <p>Forward for Open Hearing: <input checked="" type="checkbox"/> WITHOUT Reservations <input type="checkbox"/> WITH Reservations:</p> <p>Comments:</p> <p style="text-align: right;"><u>Robert P. Heaketh</u> School Committee Chr.</p> |
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Step #4 (Academic Dean): Recommended NOT Recommended Conditionally Recommended (See Comments)

Comments:

Dean Signature/Date: [Signature] 10/28/97

Step #5 (Senate Curriculum Committee): Open Hearing Date: 11/19/97 Approved by Curriculum Committee Date 11/19/97

Returned to Sponsor(s) for the following reason:

Step #6 (Senate) Date announced/voted on at Senate 11/27/97 If voted on: Approved NOT Approved

Date forwarded to Executive Vice President/Provost _____

Senate Curriculum Committee chair Signature/Date: [Signature] 11/27/97

Step #7 (Executive Vice President/Provost): Date Received JUN 28 1998

Approved

NOT Approved If no, reasons are as follows:

Student Credit Hours _____

Faculty Load Hours _____

Equalized Credit Hours _____

Official Copy & Approval Sheet Filed (Date) _____

Executive Vice President/Provost Signature [Signature]

Registrar

Date Approved Course Description Received 2-9-98

Regis Taxonomy and Course Number Assigned 6469.311

Date/Signature of Registrar B. J. Kelley 2-9-98

Notification Forward:

_____ Senate Curriculum Committee Chairperson

_____ Department Chairpersons

_____ Academic Dean(s)

_____ Registrar

_____ Sponsor(s)

Course Proposal

1. Details:

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|---|--|
| a) Course Title: | Electronics I (0909.311) |
| b) Sponsor: | Dr. Ravi P. Ramachandran, Dr. John L. Schmalzel and Electrical Engineering Curriculum Committee |
| c) Credit Hours: | 2 credit hours |
| d) Course Level: | Sophomore 2 |
| e) Curricular Effect: | Required course for electrical engineering majors |
| f) Prerequisites: | Networks I |
| g) Suggested Time/ Scale of Implementation | Spring 1998 One section |
| h) Resources | Faculty will be hired and laboratory equipment obtained consistent with Engineering School multi-year budget. Library acquisitions will be required. |

2. Rationale:

The proposed course is a revision to part of the Engineering Curriculum Proposal approved by the College Senate in December, 1994. The proposed course is consistent with the establishment of the School of Engineering approved by the Board of Trustees in February, 1995.

The invention of the transistor in 1947 revolutionized the field of semiconductor electronic devices. Such devices are commonly used in many electrical systems, the television and radio being common examples. Students must gain a sound theoretical and practical knowledge of the building blocks of many electronic devices, namely, the diode, transistor and operational amplifier. Also, the use of these basic circuit elements in chips that have widespread applications is vital. Experiments in the laboratory will complement and supplement the theory taught in class.

3. Essence of the Course:

a) Objectives:

The proposed course has a number of objectives:

- (i) Provide an overview of the basics of electronic circuit analysis and design.
- (ii) Provide a working knowledge of the characteristics and operation of circuits

using diodes.

- (iii) Provide a working knowledge of fundamental transistor circuits that include both the field-effect transistor (FET) and the bipolar junction transistor (BJT).
- (iv) Develop the ability to design, simulate, and implement electronic circuits using some combination of diodes, operational amplifiers and transistors in a simulation (SPICE program) and laboratory environment.

b) Topical Outline:

- Diodes: ideal case; physical operation; small signal model; rectifier, limiting and clamping circuits; special diode types (zener and tunnel); simulation using SPICE.
- Bipolar Junction Transistors (BJT): characteristics and graphical representation; small signal circuit model; Q-point analysis; single stage amplifier configuration; cutoff and saturation; large signal model; simulation using SPICE.
- Field Effect Transistors (FET): theory of operation; DC Q-point analysis; small signal model and equivalent circuit; amplifier design considerations; simulation using SPICE.
- Multiple transistor differential and multistage amplifiers: BJT differential pair and small signal operation; amplifiers using FETs; circuits using both BJT and FET components; operational amplifier as a BJT circuit.

c) Evaluation and Grading Procedures:

Student grades will be based on projects, examinations, homework, laboratory reports and written and oral technical communication.

d) Course Evaluation:

The proposed course will be evaluated based on student evaluations and critical review by engineering faculty.

e) Texts:

A. S. Sedra and K. C. Smith, *Microelectronic Circuits*. Fourth Edition, Oxford University Press: New York, 1996 (separate laboratory manual available).

M.S. Ghausi, *Electronic Devices and Circuits: Discrete and Integrated*. Holt, Rinehart and Winston: New York, 1985.

R. Mauro, *Engineering Electronics: A Practical Approach*. Prentice-Hall: New Jersey, 1989.

C. J. Savant Jr., M. S. Roden and G. L. Carpenter, *Electronic Design: Circuits and Systems*. Benjamin/Cummings Publishing: California, 1991.

J. Millman, *Microelectronics: Digital and Analog Circuits and Systems*. McGraw-Hill: New York, 1979.

4. Results of Consultations:

a) **Consulted Departments:** None

b) **Consultants and Consultant Statements:** N/A

c) **Written Consultations:** N/A

5. Additional Supporting Information: N/A

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6. Catalog Description:

The first course in electronic devices and circuit design covers the fundamentals of circuits involving diodes, bipolar junction transistors and field effect transistors in a simulation and laboratory environment. The basics of circuit operation and modeling are covered along with applications to multistage amplifier design. The SPICE software is used as a simulation tool.

Prerequisite of Networks I