Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Digital Electronic Systems and Circuits 14032206-4

Course Specification

Institution	**Umm Al-Qurah University**
College/Department	**College of Computer & Information Systems**/ Computer Engineering

A Course Identification and General Information

1. Course title and code: Digital Electronic Systems and Circuits- 14032206-4
2. Credit hours 3+1
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Computer Engineering
4. Name of faculty member responsible for the course **Dr. Abdellatif Semeia**
5. Level/year at which this course is offered **Level 6**
6. Pre-requisites for this course (if any) **Electronics**
7. Co-requisites for this course (if any)
8. Location if not on main campus **Umm Al Qurah University - Abdeya - Makkah Al Mukarramah**

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

A student who successfully fulfills the course requirements will have demonstrated:

1. An understanding of BJT and FET transistors modeling and small-signal analysis.
2. An ability to understand operational amplifiers and their applications.
3. An ability to analyze and evaluate the feedback and oscillator circuits.
4. An ability to identify and distinguish the properties, characteristics and definitions of digital ICs, diode and transistor modeling, DRL, DTL, RTL and TTL gates.
5. An ability to implement logic gates using transistors and ICs *

* Requires lab work

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

The contents of course must be reviewed and changed after every semester to include current research topics in the relevant area.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered

List of Topics	No of Weeks	Contact hours
• BJT transistor modeling	1	3
• BJT and FET small-signal analysis	2-3	6
• BJT and JFET frequency response	4-5	6
• Operational amplifiers and applications	6-7	6
• Feedback and oscillator circuits	8-9	6
• Properties and definitions of digital ICs	10-11	6
• Diode and transistor modeling	12	3
• DRL, DTL, RTL and TTL gates and their characteristics	13-15	9

2 Course components (total contact hours per semester):				
Lecture: 45 H	Tutorial: 15	Laboratory: 45	Practical/Field work/Internship	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)

An average student is expected to learn 08 hours per week other than class teaching.

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

(i) Description of the knowledge to be acquired

1. Students will learn BJT transistor modelling, BJT small-signal analysis, FET small-signal analysis, frequency response, operational amplifiers and their applications and feedback and oscillator circuits Students will be able to identify where, when and how enhancements of computer performance can be accomplished.
2. Students will learn the sufficient background necessary to read more advance texts as well as journal articles on the field.
3. Student will learn properties and definitions of digital ICs, diode and transistor modeling, DRL, DTL, RTL and TTL gates and characteristics.
4. Students are subjected to perform extensive Lab Tasks

(ii) Teaching strategies to be used to develop that knowledge

- Case studies: - develop analytic and problem solving skills
  - allows for exploration of solutions for complex issues
  - allows student to apply new knowledge and skills
- Real-life examples: allows analysis of real-world scenarios
- Analyse ideas and concepts bought forward in class lectures
- Lab Assignments supporting the theory
- Improvement of Circuit designing skills by extensive Lab work

1. **Assignments and their solutions, so that student can manage their problems**
2. **Open-communication with students – show willingness to assist and take questions from students and clarify explanations in the class**
3. **Students presentations on different topics in Electronics.**
4. **Practical problems using Multisim, Pspice.**

(iii) Methods of assessment of knowledge acquired

1. Exercises & Home works , Quizzes, Midterm, Project , Lab Tasks, Final Exam
2. Review outputs from the assignments in the computer lab and also from their assignments and projects.

b. Cognitive Skills

(i) Description of cognitive skills to be developed

- **Written Examinations**
- **Assignments**
- **Quizzes**
- **Class work and lab work**

(ii) Teaching strategies to be used to develop these cognitive skills

Teaching strategies to be used to develop these cognitive skills

1. **Assignments.**
2. **Labs**

(iii) Methods of assessment of students cognitive skills

- **Written Examinations**
- **Assignments**
- **Quizzes**

- **Class work and lab work**

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

i. **Understand and communicate to others the importance and relevance of statistics in the modern world**
ii. **Be an independent learner, able to acquire further knowledge with some guidance or support.**
iii. **Participate in group discussions**
iv. **Manage time and meet deadlines.**
v. **Cheating will not be tolerated**
vi. **This course requires significant effort**
vii. **Library Usage**
viii. **Spending much time in Lab Activities**

(ii) Teaching strategies to be used to develop these skills and abilities

1. **Numerical Assignments**
2. **Labs**
3. **Students Presentations**
4. **Practical hardware problems to enable students to understand the components**

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

- **Written Examinations**
- **Assignments**
- **Quizzes**
- **Class work and lab work**
- **Classroom interactions**

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

- Lab work will improve their circuit designing and analytical skills
- Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills

(ii) Teaching strategies to be used to develop these skills

- **Written Examinations**
- **Assignments**
- **Quizzes**
- **Class work and lab work**
- **Classroom interactions**

(iii) Methods of assessment of students numerical and communication skills

1. **Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills**
2. **Class discussions should indicate a student's prowess in responding**

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required

Electronic Circuit designing is used in the course for psychomotor skill.

(ii) Teaching strategies to be used to develop these skills

The students are encouraged to design and apply different electronic circuits techniques to develop psychomotor skills.

(iii) Methods of assessment of students psychomotor skills

The psychomotor skills developed in this course are assessed by assignments, presentations and project.

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	**Quiz 1**	**4**	**5**
2	**Quiz_2**	**11**	**5**
3	**Assignments and Class Participation/attendance**	**Throughout Semester**	**5**
4	**Midterm1**	**8**	**7**
5	**Project_1**	**Throughout Semester**	**5**
6	**Midterm2**	**12**	**8**

7	**Final exam**	**16**	**40**
8	**Lab Assessment**	**Throughout Semester**	**25**

D. Student Support

1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

Faculty staff member is available 8 hours per week for student help and consulting.

E Learning Resources

1. Required Text(s)

- Robert Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory" 11th Edition, Prentice Hall, 2013.
- Thomas A. DeMassa and Zack Ciccone, Digital Integrated Circuits, John Wiley, 1996

2. Essential References

Microelectronics, Millman, McGraw-Hill, 1999

3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

Students should be motivated to search related journals and conference papers and write a monthly report over it.

4-.Electronic Materials, Web Sites etc

http://www.electronics-tutorials.ws/

http://www.opamp-electronics.com/

5- Other learning material such as computer-based programs/CD, professional standards/regulations

Electronics Workbench, Multisim, Pspice

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

1. Maximum class size is 25. Each class room is provided with projector and electronic board.
2. Lecture rooms and Auditorium (Occasionally)
3. Well equipped lab with kits for practical implementations of electronic circuits
4. Internet

2. Computing resources

1. Computer lab available for practical networking and for simulations.
2. Students are encouraged to bring in their laptops and use them in solving problems in the class room.

3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

Sufficient number of National Instrument Elvis Boards with computers and components are required.

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

1. **Course Survey and students Feedback for each learning outcome of the course.**

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

Monthly Meeting discussing current teaching methods.

3 Processes for Improvement of Teaching

1. **Faculty Development Program (Provide Training to the faculty)**
2. **Departmental Meeting**

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

Departmental & Management Meetings.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Course Improvement Plan

Six Step Plan for Course Improvement

- ❑ Step 1) Review the minimum, average, and maximum score for each topic (framework objective). Mark each score which is less than 80% (highlight, circle, etc.)

- ❑ Step 2) For each topic marked for analysis, review the current curriculum framework. Reflect on why scores are low in that topic area.

- ❑ Step 3) For each topic marked for analysis, review the lesson plans used to teach the topic. Determine if the lesson plan and the topic are correlated. Reflect on how this topic was taught. What would improve student learning and retention? …a different instructional method? …devoting more time to the topic?

- ❑ Step 4) Decide on the action you can take to enhance teaching and learning in the course. Indicate, in note or narrative form, what action you will take. Communicate this to administrators and colleagues. Lesson plans can be updated to include the improvements/changes that you will utilize for the next school year.

- ❑ Step 5) Make some predictions about how much you believe these improvements and/or changes will affect the student's learning and retention.

- ❑ Step 6) The improvement process is an ongoing activity that should be visited each year. When it comes time for next year's Improvement Plan you can look back at your predictions and determine how well your plan worked.

    - ⇨ Were the resources that you listed as "not available" a stumbling block in making improvement? How can these resources be obtained?
    - ⇨ Have you made significant enough improvements that a principal would consider obtaining those resources in hopes that even more improvement will be made?
    - ⇨ Were you realistic in your goal setting?