TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Dep. of Laser and Optoelectronics Eng.
3. Course title/code	Optical Communications / LOPE 4201
4. Programme(s) to which it contributes	Laser and Optoelectronics programs
5. Modes of Attendance offered	Full Time
6. Semester/Year	1st & 2nd semesters/ year
7. Number of hours tuition (total)	4 hours/week – included practical hours 2*30=60hours/year (theoretical) 2*30=60hours/year (practical)
8. Date of production/revision of this specification	19/05/2014
9. Aims of the Course	
- Introduction of advanced concepts in optical communications for students of the Fourth year in both branches, like theory of light propagation within optical waveguide, optical fiber types and etc.	
- Theoretical and experimental preparation of students to work in the field of optical fiber communications.	
- Applying physical fundamentals of light wave propagation inside optical guide.	
- Definition of the theory of operation of optoelectronics devices and their applications in engineering problems.	

10· Learning Outcomes, Teaching ,Learning and Assessment Methods
A- Knowledge and Understanding A1. Know the classification of different types of optical fibers e.g. MMF and SMF, and applications. A2. Enable the student to use mathematical equations for the light motion inside the physical media and describe the appropriate boundary conditions to find solutions to physical phenomena whose are playing a drawback point for fibers. A3. Enable the student to learn and understand the basic characteristics of light sources and detectors and explain their structures, advantages and drawbacks. A4. Enable the student to learn and understand the theoretical principles of signal distortion. A5. Enable the student to learn and understand the practical applications of currently used in communication industries and how to build a proper system with good quality of operation.
B. Subject-specific skills B1. Find solutions to the problems of signal attenuation, signal dispersion in the optical fiber. B2. Calculation of power loss as light travels along distances. B3. Explain the concept of light modulation and the effect of low power received by optical detector on the overall system performance. B4. Selection and use of mathematical function to calculate the signal to noise ratio at receiver.
Teaching and Learning Methods
The development of the student's ability to apply the knowledge in order to be able to correct analysis of the question and thus put the appropriate assumptions and interpretation to reach a solution. Through textbooks and lectures, in addition to the (optical fiber communications) Laboratory experiments.
Assessment methods
- Classroom discussions and to identify the potential of the student to analyze problems. - Homework. - Sudden exams. - Quarterly examinations. - Projects and seminars. - The student's performance in the laboratory.

C. Thinking Skills
C1. Description of optical fiber fabrication.
C2. Description of types and origins optical light sources.
C3. Description of intersymbol interference and Bit Error Rate.
C4. Understanding the theory of optical detectors operation.
C5. Describe the importance of optical loss that come from fiber cable mismatching.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1. Employing all due respect to the course such as software, tables and diagrams to solve engineering problems.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-4	8 hours per week (included lab time)	Knowledge and Understanding	Optical Fiber: Construction and light wave propagation.	Motivate students to develop its capabilities in the analysis of data question and diagnose the problem and describe the solution.	Discussions. Homework. Sudden exams. Quarterly examinations. Projects and seminars. Laboratories.
5-9	8 hours per week (included lab time)	Knowledge and Understanding	Signal attenuation in optical fiber	=	=
10 - 13	8 hours per week (included lab time)	Knowledge and Understanding, subject specific skills	Optical Sources	=	=
14-17	8 hours per week (included lab time)	Knowledge and Understanding, subject specific skills	Power lunching and coupling	=	=
18-21	8 hours per week (included lab time)	Knowledge and Understanding, subject specific skills	Optical Detectors	=	=
22-25	8 hours per week (included lab time)	Knowledge and Understanding, subject specific skills	Optical receivers	=	=

26-30	8 hours per week (included lab time)	Knowledge and Understanding, subject specific skills	Link Budget Analysis	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	- Gred Kesier, *Optical Fiber Communications*, 3ed Edition. McGraw-Hill, 2012.
Special requirements (include for example workshops, periodicals, IT software, websites)	Lectures are available on the http://www.uotechnology.edu.iq/dep-laserandoptoelec-eng/branch2.htm
Community-based facilities (include for example, guest Lectures , internship , field studies)	- Conducting experiments in the laboratory. - Conducting seminars. - Visits to work sites.

13. Admissions	
Pre-requisites	Pass the 3d year exam. In addition, students have the capacity to communicate in English to read and write
Minimum number of students	No identification.
Maximum number of students	No identification.

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Dep. of Laser and Optoelectronics Eng.
3. Course title/code	Microprocessor \ LOPE 4202
4. Programme(s) to which it contributes	B.Sc., In Laser and Optoelectronics
5. Modes of Attendance offered	Full Time
6. Semester/Year	Fourth year
7. Number of hours tuition (total)	8 hours – included practical hours
8. Date of production/revision of this specification	19/05/2014
9. Aims of the Course	
- Introduction of advanced concepts in microprocessor for students of the Fourth year in both branches.	
- Definition of the theory of operation of microprocessor and their applications in engineering field.	

10· Learning Outcomes, Teaching ,Learning and Assessment Methods
A- Knowledge and Understanding A1. Know the classification of numbers used in digital electronics and logical operations. A2. Enable the student to understand digital logic and logic gates fundamentals and how to build logical circuits for different use and applications e.g adder and subtractor. A3. Enable the student to learn and understand the 8085 microprocessor operation and its components, and the function of each one. A4. Enable the student to learn and understand the microprocessor programing language (assembly language of 8085). A5. Enable the student to learn and understand the practical applications of microprocessor.
B. Subject-specific skills B1. Build of multi stage complex logical circuit to perform different applications. B2. To make a student familiar with how to simplify complex logical equations using different methods such as Karnouph Map. B3. Explain the concept of how microprocessor communicate with input and output devices and other peripherals.
Teaching and Learning Methods
The development of the student's ability to apply the knowledge in order to be able to correct analysis of the question and thus put the appropriate assumptions and interpretation to reach a solution. Through textbooks and lectures, in addition to the (Microprocessor) Laboratory experiments.
Assessment methods
- Classroom discussions and to identify the potential of the student to analyze problems. - Homework. - Sudden exams. - Quarterly examinations. - Projects and seminars. - The student's performance in the laboratory.
C. Thinking Skills C1. Writing programs using 8085 Assembly Language. C2. How to convert between different numerical methods. C3. Data Analysis using Karnouh map and other methods of simplifications. C4. Understanding the function of Microprocessor data and address buses.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Employing all due respect to the course such as software, tables and diagrams to solve engineering problems.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	8 hours per week (included lab time)	Knowledge and Understanding, Specific Skills and Thinking Skills	Numerical Systems.	Motivate students to develop its capabilities in the analysis of data question and diagnose the problem and describe the solution.	Discussions. Homework. Sudden exams. Quarterly examinations. Projects and seminars. Laboratories.
3-4	8 hours per week (included lab time)	Knowledge and Understanding, Specific Skills and Thinking Skills	Logic Algebra and Logic Gates.	=	=
5 - 8	8 hours per week (included lab time)	Knowledge and Understanding, Specific Skills and Thinking Skills	Logic Simplification methods and Logic Gates.	=	=
9-10	8 hours per week (included lab time)	Knowledge and Understanding, Specific Skills and Thinking Skills	Adder, Subtractor, Comparator, Decoder and Encoder	=	=
11-15	8 hours per week (included lab time)	Knowledge and Understanding, Specific Skills and Thinking Skills	Flip-Flops, Counter, ADC and DAC	=	=
16-30	8 hours per week (included lab time)	Knowledge and Understanding, Specific Skills and Thinking Skills	Microprocessor 8085	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	-Morris M. Mano, Digital Design, 3ed Edition, Prentice Hall. -Thomas L. Floyd, Digital Fundamentals, 9th Edition, Prentice Hall. -R. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085.
Special requirements (include for example workshops, periodicals, IT software, websites)	Lectures are available on the http://www.uotechnology.edu.iq/dep-laserandoptoelec-eng/branch2.htm
Community-based facilities (include for example, guest Lectures , internship , field studies)	- Conducting experiments in the laboratory.

13. Admissions	
Pre-requisites	Pass the 3d year exam. In addition, students have the capacity to communicate in English to read and write
Minimum number of students	No identification.
Maximum number of students	No identification.

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of technology
2. University Department/Centre	Laser &optoelectronics engineering department
3. Course title/code	Semiconductor Devices/OPE4204
4. Programme(s) to which it contributes	Laser & Optoelectronics programs
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semester / Year
7. Number of hours tuition (total)	Two Hours / Week 2H X30W=60H/Year
8. Date of production/revision of this specification	
9. Aims of the Course	
1. Prepare engineers with high efficiency specialists in the field of Laser Engineering and able to develop their skills in the fields of engineering knowledge and well versed in the field of use	

of different applications specialized in the design and use of services related to jurisdiction
2. Engineers create a joint organized labor, and enhance communication with institutions and universities scientific and engineering in the responsibility of local and international professional and ethical
3. The development of the spirit of leadership among students and prepare them for their roles after graduation
4. Supplement the state institutions and private technology specialists, experts, consultants, scientists, and support scientific research centers and engineering projects distinguished scientific cadres
5. Work on developing and improving the efficiency of scientific and administrative faculty members and enable them to use the latest scientific methods, as well as the optimal use of the possibilities of section to keep up with scientific developments and qualitative cooperation with international universities and guidance to serve the community and state institutions

10· Learning Outcomes, Teaching ,Learning and Assessment Method
A- Knowledge and Understanding A1.The ability to apply knowledge in the fields of mathematics, science, engineering specialized in engineering applications of laser A2.Collection of science in various disciplines necessary for Laser Engineering A3Prepare students for continued learning and self-collection techniques and new skills in the field of engineering. A4.Building skills by following the correct procedures
B. Subject-specific skills B1.Literatures B2. Tutorials
Teaching and Learning Methods
1- Tutorials 2- Power point literatures by Data show Reviews.
Assessment methods
1- Examinations. 2- Quizzes. 3- Home works. 4-Tutorials and discussions.
C. Thinking Skills C1.The ability to devise and selection tests emerging and collect, collate and analyze the results of those tests C2.Compared to the ideas of the proposed designs and criticism and scrutiny, the terms of reference of Laser Engineering C3.The ability to propose alternatives to approach engineering problems and scientific manner to determine the appropriate method to address these problems
Teaching and Learning Methods
1- Literatures. 2- Tutorials.

Assessment methods
1- Test 1 2- Test 2. 3- Quizzes and Assignments. 4- Final Examination
D. General and Transferable Skills (other skills relevant to employability and personal development) D1. Ability to work with others within the discipline of work per team, teamwork. D2.Full realization of the moral and practical responsibility for the work that will exercise the student after graduation, the ethics of the profession

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	2	Literature	Energy bands in typical semiconductor	Lecture & p.p Show.	Examinations ,Quizzes,.
3-7	=	=	Band structure of semiconductor	=	=
8-12	=	=	Elementary transport in semiconductors	=	=
13-20	=	=	Contact phenomena	=	=
21-24	=	=	Semiconductor diode	=	=
25-27	=	=	Zener diode	=	=
28-30	=	=	Transistor	=	=

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	
Special requirements (include for example workshops, periodicals, IT software, websites)	Internet web sites
Community-based facilities (include for example, guest Lectures , internship , field studies)	

13. Admissions

Pre-requisites	Pass from last stage (secondary school).
Minimum number of students	No limit.
Maximum number of students	No limit.

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the Remote sensing and image processing course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser and Optoelectronics Engineering
3. Course title/code	Remote sensing and Image Processing /OPE4305
4. Programme(s) to which it contributes	Optoelectronics Engineering Program
5. Modes of Attendance offered	Full time

6. Semester/Year	1st and 2nd semesters / year
7. Number of hours tuition (total)	2hours / week 2H*30=60 hours/ year
8. Date of production/revision of this specification	22/7/2014

9. Aims of the Course
1. Understanding the main concepts of remote sensing.
2. Defining the main systems that used in remote sensing especially airborne and spaceborne satellites.
3. The wide applications for gathering information about Earth, seas and oceans and also the in atmospheric broadcasting and weather and climate meteorological applications.
4. Studying the main concepts of image processing.
5. Studying Fourier Transform in image processing for continuous and discrete functions.
6. Studying the convolution and correlation for some signals and functions
7. Studying the interaction of electromagnetic radiation with atmosphere and Earth's surface.

10· Learning Outcomes, Teaching ,Learning and Assessment Methods
B- Knowledge and Understanding A1.Enabling student to get the knowledge and understanding of the theoretical principles of remote sensing for different systems. A2. Understanding of Ideological philosophy of remote sensing and their applications. A3. Understanding the knowledge of the basic mathematical tools and functions used in Image processing. A4. At the end of the year the student should be able to understanding of the main concepts, theory and application of remote sensing and image processing.
B. Subject-specific skills B1.An ability to analyze the main interactions occurred between electromagnetic radiation and atmosphere, Earth's surface features. B2. An ability to identify, formulates, and solve some problems used in image processing tools. B3. An ability to use the techniques, skills and modern tools necessary for remote sensing and image processing in practice.
Teaching and Learning Methods
1-Lecture notes and classroom discussions. 2-Reports related to theory and applications of remote sensing. 3-Solving problems, quizzes and assessments. .
Assessment methods
1-First semester exam (1٥%). 2- Second semester exam (15%). 3 - Home works, quizzes, reports (١٠%). 4. Final Examination (60%)

C. Thinking Skills C1. An ability to apply knowledge of Remote sensing. C2. An ability to understand and discuss the main concepts for remte sensing problems. C4.Arranging and classifying the remote sensing systems. C5. Ability to solving problems for different function that used in image processing and make sense in mathematical tools.
Teaching and Learning Methods
1. Discussions and dialogue of questions using diverse ideas concepts. 2. Preparing individual and collective scientific reports for remote sensing systems by students.
Assessment methods
1. Daily and monthly examinations, 2. Attendance in classroom in the specified time of lecture. 3. Participate effectively in the classroom. 3. Individual activities for students.

D. General and Transferable Skills (other skills relevant to employability and personal development) D 1 - The student should be able to connect and communicate written and oral communication, research and information gathering . D 2 - Ability to discuss different subjects related with remote sensing and communication. D 3 - Ability to prepare different reports, summaries, Posters and Mural in a particular subject. D 4 - leadership team collectively to various activities

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Theory, discusion, and Tutorial	Fundamentals of Remote Sensing	Lectures on whiteboard & p.p Show	Examinations ,Quizzes, Reports
2	2	=	The electromagnetic spectrum	=	=
3	2	=	Interactions with the atmosphere	=	=
4	2	=	Radiation –target interactions	=	=
5	2	=	Passive Versus active Sensing	=	=
6	2	=	Satellites and Sensors on Ground, in the air, in space.	=	=
7	2	=	Resolution Concepts	=	=
8	2	=	Multispectral scanning + thermal Imaging	=	=
9	2	=	Weather Satellites	=	=
10	2	=	Land Observation satellites	=	=
11	2	=	Microwave remote sensing	=	=
12	2	=	Radar Basics	=	=
13	2	=	Viewing Geometry and spatial resolution	=	=
14	2	=	Radar image properties	=	=
15	2	=	Advanced Radar Application	=	=
16	2	=	Introduction to image processing	=	=
17	2	=	Introduction to the Fourier transform	=	=
18	2	=	Discrete Fourier transform DFT	=	=
19	2	=	Two-dimensional Fourier transform	=	=
20	2	=	Convolution and Correlation	=	=
21	2	=	Solved Problems using Convolution	=	=
22	2	=	Solved Problems using Correlation	=	=
23	2	=	Sampling of one-dimensional functions	=	=
24	2	=	Fast Fourier Transform FFT	=	=
25	2	=	The inverse of FFT	=	=
26	2	=	Implementation of FFT	=	=
27	2	=	Other separable image transform	=	=

28	2	=	Walsh Transform	=	=
29	2	=	Hadmard Transform	=	=
30	2	=	The Hotelling Transform	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	(1) Canada Center for Remote Sensing (2) Digital Image Processing, Rafael C, Gonzalez (3) Lectures relating to Article school
Special requirements (include for example workshops, periodicals, IT software, websites)	Internet web sites.
Community-based facilities (include for example, guest Lectures , internship , field studies)	N/A

13. Admissions	
Pre-requisites	Pass from last stage (year).
Minimum number of students	No limit
Maximum number of students	No limit

PROGRAMME REVIEW "OPTOELECTRONICS & LIGHT MODULATION" for 4th year

This Course Specification provides the main features of the Theory of optoelectronics for the students of 4th year in optoelectronics Engineering. Learning outcomes which gained by this program will help a typical student to achieve and demonstrate the learning opportunities that are provided during the course study and to comply with the programmer specification as laser and optoelectronics Engineering.

1. Teaching Institution	University of Technology
2. University Department/Centre	Optoelectronics and laser Engineering
3. Course title/code	Optoelectronics & Light Modulation / OPE 4401
4. Programmers(s) to which it contributes	Bsc. Optoelectronic engineering
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semester / 4th Year
7. Number of hours tuition (total)	Theoretical : 2hrs/w 2H X30W=60H/Year
8. Date of production/revision of this specification	19/5/2014

9. Aims of the Course

Definition of the basic concepts and advanced optoelectronics material for students of the - .fourth year goal of Optoelectronics Engineering Branch

Concentration on electro-optic basic optical electronics, which are used in the construction - .of devices and some modern systems

- Clarify the scientific applications of this field in all disciplines of modern scientific and relevance in the present day.

10· Learning Outcomes, Teaching ,Learning and Assessment Method
A- Knowledge and Understanding A1.Enabling student to get the knowledge and understanding the fundamental of optoelectronic engineering for different circuits. A2. Enabling student to analysis different optoelectronic circuits by analysis methods. A3. Enabling student to get the knowledge and understanding the network methods for different circuits.
B. Subject-specific skills B 1 - mathematical analysis of the phenomenon of the optical polarization of various types and derive the equations. B 2 - A study of some effects such as the effects of optoelectric Kier and Faraday physically and mathematically. B3-Analysis of the optical polarization circles mathematically to find the – ٣ type of polarization of the light beam after passing through several stages of the polarizer
Teaching and Learning Methods
1-Practical experiments. 2- Simulation and Innovation. 3- literatures by Data show Reviews. 1-Literatures. 2- Tutorials.
Assessment methods
1-Examinations. 2-Quizzes. 3- Home works. 4- Tutorials and discussions.
C. Thinking Skills C 1 - What is the description polarization of light. C 2 - the mathematical description of the phenomenon of polarization of all kinds, derived mathematically. C 3 - Description Builder and types of optical phenomena. C 4 - to understand the theory of action projectors and projection screens, such as liquid Crystal Display screens. C 5 - Description of how to enlarge the optical signal and noise accompanying the process of magnification
Assessment methods
1-Test 1 2-Test 2. 3-Quizzes and Assignments. 4- Laboratory. 5-Final Examination

D. **General and Transferable Skills (other skills relevant to employability and personal development)**

D 1 - employing all due respect to the themes of the software and tables and diagrams to solve engineering problems

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-4	2H/W	Lecture	Polarization , muls law,Birefringence, and Retardation , Elecro-Optic effect , Pockls Cell, Optical Activity , Kerr Modulation , Optical frequency Kerr effect .	Lecture & pdf Show.	Examinations ,Quizzes, and Reports.
5 - 9	=	=	Scanning and Switching , Magneto-Optic Device and Faraday Effect, Acousto-Optic Effect,	=	=
10-13	=	=	Optical Amplifiers	=	=
14-17	=	=	Plasma Displays	=	=
18-21	=	=	Display Brightness	=	=
22-25	=	=	Liquid Crystal Displays	=	=
26-30	=	=	Numeric Displays		

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	John Wilson, John Hawkes, “Optoelectronics, An Introduction”, 3ed Edition, Prentice Hall, 1998.
Special requirements (include for example workshops, periodicals, IT software, websites)	Lectures are available on the site http://uotechnology.edu.iq/dep-laserandoptoelec-eng/branch/branch2.htm

Community-based facilities (include for example, guest Lectures , internship , field studies)	- Conduct the experiments in the laboratory - The work by seminars - Summer training

13. Admissions	
Pre-requisites	-Pass from last stage (secondary school). - The possibility of communication in English
Minimum number of students	No limit.
Maximum number of students	No limit.

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Dep. of Laser and Optoelectronic Eng .
3. Course title/code	solid state electronic / OPE 4307
4. Programme(s) to which it contributes	Optoelectronics Engineering
5. Modes of Attendance offered	Full Time
6. Semester/Year	1st & 2nd semesters / year

7. Number of hours tuition (total)	2hours/week 2*30=30H/yeaar
8. Date of production/revision of this specification	24-6-2014
9. Aims of the Course	
-Introduction to solid state electronic for students of the fourth year/optoelectronic engineering branch, like semiconductor.	
- Enable the student to work in the different field.	
-The application of the basic principles of semiconductor.	

10· Learning Outcomes, Teaching ,Learning and Assessment Methods
A- Knowledge and Understanding A1. Know and study the semiconductor material. A2.Enable the student to study and understand the crystal growth of the semiconductor material. A3. Enable the student to study and understand the quantum mechanism. A4. Enable the student to learn and understand the theory of quantum mechanism. A5. Enable the student to study basic principles of semiconductor.
B. Subject-specific skills B1. Find solutions to the problems of the growth crystal in the semiconductor. B2.Calculate the current drift and current carrier and the Graded impurities distribution. B3. Explain the concept of the Schrodinger's wave equation and the physical meaning of the wave function. B4. Explain the generation of energy band (Allowed and forbidden).
Teaching and Learning Methods
The development of the student's ability to apply the knowledge in order to be able to correct analysis of the question and thus put the appropriate assumptions and interpretation to reach a solution. Through textbooks and lectures, in addition to the (Solid State Electronic).
Assessment methods
-Classroom discussionsand to identify thepotential ofthe studentto analyzeproblems. -Homework. -Suddenexams. -Quarterly examinations. -Projects andseminars.

C. Thinking Skills C1. Description of the atomic structure ,Bohr Model, the hydrogen atom C2. Description of the crystal growth method. C3. Description of the quantum theory of the solid material. C4. Understanding the theory of generation and recombination of the Carrier in the semiconductor. C5. Describe of the generation of the p-n junction and study the properties.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1.Employing all due respect to the course such as software, tables and diagrams to solve engineering problems.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	3 hours per week	Atomic bonding Bohr Model. Atomic Structure The hydrogen atom	**Atoms and Electrons**	Motivate students to develop its capabilities in the analysis of data question and diagnose the problem and describe the solution.	Discussions. Homework. Sudden exams. Quarterly examinations. Projects and seminars. Laboratories.
4-7	4 hours per week	Growth from melt Crystalline and non crystalline material Single crystal and polycrystalline material Epitaxial growth	**Growth of semiconductor material**	=	=
8-13	6 hours per week	Principle of quantum mechanics Energy quantum The uncertainty principle Schrodinger's wave equation The wave equation T he physical meaning of the wave function boundary conduction. Electronic in free space The infinite potential well The step potential Function The potential Barrier	**Introduction to quantum mechanics**	=	=
14-19	6 hours per week	Allowed and forbidden energy band Formation of energy band The Kronig-Penncy Model The K-Space diagram Electronic Conduction in	**Quantum Theory of solid**	=	=

		Solids Density state functions Mathematical derivation Extension to semiconductors			
20-23	4 hours per week	Carrier Drift Carrier Diffusion Graded impurities distribution	**Carrier Transport phenomena**	=	=
24-26	3 hours per week	Carrier generation and recombination Characteristic of Excess carrier	**Non equilibrium Excess carrier in semiconductor**	=	=
27-30	4 hours per week	pn Junction current small-signal model of the pn Junction Generation-Recombination currents Junction break down Tunnel Diode	**The p-n Junction Diode**	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	-Semiconductor Physics and Device Basic Principle Third Edition Donald A.Neamen McGraw-Hill Higher Education 2003 -Solid State Electronic Device BEN &STREETMAN PRENTIC HALL,4th Edition 1995
Special requirements (include for example workshops, periodicals, IT software, websites)	Lectures are available on the http://www.uotechnology.edu.iq/dep-Laser &optoelectronic/index.htm
Community-based facilities (include for example, guest Lectures , internship , field studies)	- Conducting seminars.

13. Admissions

Pre-requisites	Pass the ٣rd year exam. Solid state physics & material science/Code: OPE 3302.
Minimum number of students	No identification.
Maximum number of students	No identification.

TEMPLATE FOR COURSE SPECIFICATION

PROGRAMME REVIEW Optical design for 4th year

COURSE SPECIFICATION

This course will improve the ability of the students to understand, speak, read and write English as a second language with some technical texts. It is also intended to teach them, how to use technical English effectively as a language of instruction, Lab. Experiments and Exercises, examples, using Technical Terminologies as close as possible to the lectures they receive during their study.

1. Teaching Institution	University of technology
2. University Department/Centre	Laser & optoelectronics Eng. Dept.
3. Course title/code	Optical design/ OPE4308
4. Programme(s) to which it contributes	Optoelectronics eng.
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semester / Year
7. Number of hours tuition (total)	Two Hours (theory) / Week Two Hours (application) / Week 2H X30W=60H/Year theory 2H X30W=60H/Year Appli
8. Date of production/revision of this specification	7/7/2014
9. Aims of the Course: This course is designed to explore the current and future use optical design which can be used in optical instruments and photonics devices. The student will receive a comprehensive overview of geometrical optics theory , wave theory, aberration descriptions and design of famous lens and devices.	

10· Learning Outcomes, Teaching ,Learning and Assessment Method
A. Knowledge and Understanding A1.Enabling student to get the knowledge and understanding of the theoretical principles of using optics (geometric and wave). A2. Proceeding the understanding the art of optical design by using ZEMAX.
B. Subject-specific skills B1.optical design for photonics devices B2. Design for fiber optics coupling B3. Analysis for achromatic lenses design.
Teaching and Learning Methods
2- Tutorials 3- Power point literatures by Data show Reviews.
Assessment methods
4- Examinations. 5- Quizzes. 6- Home works. 7- Tutorials and discussions.
C. Thinking Skills C1. Ability to use optical design progames. C2. Ability to design and analysis optical system design. C3. Optimization for optical system C4. Ability to improve old optical design
Teaching and Learning Methods
2- Literatures. 3- Tutorials.
Assessment methods
4- Test 1 5- Test 2. 6- Quizzes and Assignments. 7- Final Examination

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1. Design and analysis theoretically and the simulated optical design projects and the relation between them.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	2	Literature	Introduction- Introduction to ZEMAX	Lecture & practical.	Examinations ,Quizzes,.
3-4	=	=	Conventions and Aspheres/ Paraxial World	=	=
5-6	=	=	Stops and Pupils/ Glass, and the Landscape Lens	=	=
7,,8	=	=	Aberrations in General/ Solves and Merit Function	=	=
9,10	=	=	Splitting a Lens/ Spherical Aberration	=	=
11,12	=	=	Lens Bending and Aberration Balancing/ Symmetry and the Periscopic Lens	=	=
13,14	=	=	Coma and Astigmatism /Field Curvature and Field Flattener	=	=
15,16			**Distortion/16 Axial Color and Achromats**		
17,18,19			Bending Achromats/ Secondary Color/ **Large Air-Spaced Achromat and French Landscape Lens**		
20,21,22			Microscope/ **Apochromat/ Eyepiece Design**		
23,24,25			**Field Lens and Windows/ Mirrors and Corrector Plates/ Symmetric Achromat and Vignetting**		
26,27			**Telescopes/ Relating Defocus, Astigmatism, and Field Curvature**		
28,29			**Celor Lens/ Triplet Lens and Image Compactness/ Petzval Lens**		
30			**Strehl Ratio/ Axial Intensity and Depth of Focus/**		

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Literatures in different learning skills for English language.
Special requirements (include for example workshops, periodicals, IT software, websites)	Internet web sites.
Community-based facilities (include for example, guest Lectures , internship , field studies)	N/A

13. Admissions	
Pre-requisites	Pass from last stage (secondary school).
Minimum number of students	No limit.
Maximum number of students	No limit.