COURSE SPECIFICATION

This Course Specification provides the main features of the Theory of Mathematics for the students of 1st year in Laser and Optoelectronics Engineering. Learning outcomes which gained by this course will help a typical student to achieve and demonstrate the learning opportunities that are provided during the course study and to comply with the optoelectronics engineering program specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	College of Laser and optoelectronics Engineering
3. Course title/code	Mathematics (I) / 1201
4. Title of Final Award	B.Sc. of Optoelectronics Engineering
5. Modes of Attendance offered	Full Hours
6. Semester/Year	1st &2nd Semester / year
7. Number of hours tuition (total)	Three Hours / Week (2hours theory ,1 hour tutorial) 3H X30W=90H/Year
8. Date of production/revision of this specification	2/7/2017

9. Aims of the Course

The aims which can be achieved during teaching this course program are as follows:

1- Aims of the course are to graduates a qualified engineers who they have theoretical experience in advanced mathematics in optoelectronics field.
2- This unit of study aims to provide theoretical knowledge and principles of advanced Mathematics and the ability to analysis and solve the mathematical problems.
3- Illustration and discussion the Main Theoretical Principles of functions & inverse functions with their graphs, limits & continuity, determinates,

matrices, polar coordinates, complex number , vectors , techniques of derivative, integration & differential equation with their applications in optoelectronics field.
4- Understanding of different methods to solve the same mathematical problem

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 advanced mathematics for different optoelectronics systems.
A2. Understanding of Ideological philosophy of advanced mathematics and their applications.
A3. Understanding the knowledge of using mathematics for different methods of solution in optoelectronics applications.
A4. At the end of the year the student should be able demonstrate knowledge and understanding of the concepts, theory and application of Advanced Engineering Mathematics.

B. Subject-specific skills
B1.An ability to analyze the mathematical problems in optoelectronics field.
B2. An ability to identify, formulates, and solves engineering problems.
B3. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Teaching and Learning Methods

1- Lecture notes and classroom discussions.
2- Theoretical examples and applications.
3- Solving problems, quizzes and assessments. .
4- Power point literatures by Data show Reviews.

Assessment methods

1- First semester exam (15%).
2- Second semester exam (15%).
3- Home work and quizzes (10%).
4- Final exam (60%).

C. Thinking Skills
C1. An ability to apply knowledge of mathematics, science and engineering comparing then conclusion.
C2. Investigation in engineering problems and find effective solutions for mathematics problem in optoelectronics field.
C3. Ability to analysis and decision making for mathematics problem.
C4. Ability to solving problems, survey, work collectively, leadership groups .

Teaching and Learning Methods

The course in Mathematics is covered by classical lecture and after each topic , sample problem will be provide to the student , and during tutorial hours the students will be able to apply the theories and principles for solving the mathematical

problems in electromechanically field.	
Assessment methods	
1- Examinations and questions in the classroom. 2- Home works & Quizzes. 3- Tutorials and discussions. 4- The assessment of this element is by written examination which enables each student to demonstrate ability to analyses and solve new problems	

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

D1. Training on several mathematical methods to solve the same problem.
D2. An ability for solving different mathematics problems in Engineering applications.
D3. An ability to communicate effectively.
D4. Recognition of the need for , and the ability to engage in life-long learning.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Theory and discussion	Introduction, Quadratic Formula, Binomial Formula	White board ,Lecture & p.p Show.	Examinations ,Quizzes, and Homework .
2	=	=	Straight Line, Conic Sections (Circle, Parabola, Ellipse, Hyperbola)	=	=
3	=	=	Functions (Inequality, Intervals, Domain & Range)	=	=
4	=	=	Functions (Inverse Functions, Drawing Function, Absolute Value)	=	=
5	=	=	Functions (Trigonometric Functions, Inverse Trigonometric Functions, Logarithmic Function)	=	=
6	=	=	Function(Natural Logarithmic Function, Exponential Function, Hyperbolic Functions)	=	=
7	=	=	Functions (Inverse Hyperbolic Functions)	=	=
8	=	=	Limits & Continuity	=	=
9	=	=	Determinants (Properties, Grammer's	=	=

			Rule, Applications)		
10	=	=	Matrices (Operations, Inverse of Square Matrix, Eigen Values & Eigen Vectors)	=	=
11	=	=	Polar Coordinates	=	=
12	=	=	Complex Numbers	=	=
13	=	=	Applications of Complex Numbers	=	=
14	=	=	Vectors, Properties of Vectors, Vectors in Free Space	=	=
15	=	=	Applications of Vectors	=	=
16	=	=	Differentiation (Derivative Definition, Techniques of Derivative, Applications)	=	=
17	=	=	Differentiation (Derivative of Trigonometric Functions, Derivative of Inverse Trigonometric Functions ,Chain Rule,)	=	=
18	=	=	Differentiation (Parametric Equations, Implicit Differentiation)	=	=
19	=	=	Differentiation (Derivative of Some Functions, Derivative of Hyperbolic Functions, Derivative of Inverse Hyperbolic Functions)	=	=
20	=	=	Integration (Indefinite Integrals & Substitution Rule)	=	=
21	=	=	Integration (Definite Integrals, Properties, Relation Between Indefinite & definite Integrals)	=	=
22	=	=	Forms of Integration (Substitution Methods, By Part, By Tabulate)	=	=
23	=	=	Integration (Partial Fractions For 2nd Equation Degree in Denominator)	=	=
24	=	=	Integration (Product between Trigonometric Functions, Product Between Hyperbolic Functions)	=	=
25	=	=	Integration (Simple Square Root, Trigonometric Substitutions, Hyperbolic Substitutions)	=	=
26	=	=	Integration of (Irrational Functions, Rational Functions)	=	=
27	=	=	Applications of Definite Integral(Area, Area Under the Curve, Area Between Curve and y-axis, Area Between Two Curves)	=	=
28	=	=	Differential Equations D.E, 1st degree equation: 1-Direct Integration , 2-Variable Separable)	=	=
29	=	=	Differential Equations D.E.(3-	=	=

			Linear Equations,4-Homogeneous,5- Exact)		
30	=	=	Applications of D.E. in Electrical & Mechanical Engineering	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1-Theory of advanced mathematics with application by Thomas Calculus. 2-Books and Literatures in different kinds of Advanced Mathematics
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.

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 and Optoelectronics Eng . College
3. Course title/code	University physics /LOPE 1202
4. Programme(s) to which it contributes	Laser and Optoelectronics Engineering Programs
5. Modes of Attendance offered	Full Time
6. Semester/Year	Annual /Year
7. Number of hours tuition (total)	4 Hours / Week (2hours theory ,2 hour Application) 4H X30W=120H/Year
8. Date of production/revision of this specification	26-6-2017

9. Aims of the Course
- Introduction to University physics for students of the first year/Laser and optoelectronic engineering programs

-Enable the student to work in the different field.

- The application of the basic principles of light and material.

10· Learning Outcomes, Teaching ,Learning and Assessment Methods

A- Knowledge and Understanding
A1. Know the properties of mirrors and lenses and how the images form.
A2.Know he manning of inversion population.
A3.Know the student what the photoelectric effect.
A4. Enable the student to study the Bohr Model, the hydrogen atom.
A5. Enable the student to study the interference and diffraction phenomena.

B. Subject-specific skills B1. Find solutions to the problems of the images in mirrors and lenses. B2 Calculate the wavelength and index of refraction and the intensity distributed for interference and diffraction pattern**.** B3. Explain the concept of the physical equation and how derivation.
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 (Unvi. physics).
Assessment methods
-Classroom discussions and to identify the potential of the student to analyze problems. -Homework. -Sudden exams. -Quarterly examinations. -Lab. Examinations.
C. Thinking Skills C1. C2. C3. C4.
Teaching and Learning Methods

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	The nature of light and propagation	Light sources Wave,wavefront,rays Speed of light Reflection and refraction laws Index of refraction	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.
5-8	8	Reflection and refraction in plane surface	Huygens's principle Derive refraction law from Huygens's principle Reflection internal total Refraction in prism dispersion	=	=
9-13	10	Image Formation by a Plane Mirror	Reflection in plane mirror reflection in spherical mirror graphical method refraction in plane surface	=	=
14-17	8	Lenses and optical instrument	Thin lenses Divergence lenses Graphical method Image formation in lenses Thick lenses Lenses aberration The eye The amplifier The camera The microscope The telescope	=	=
18-22	10	Interference and diffraction	Interference principle Young's experimental Interference in thin film Thin coating on glass Mickelson interference Frenal diffraction faranhofer diffraction in single slit X-ray diffraction Resolving power	=	=
23-26	8	polarization	Polarization Polarization by reflection	=	=

			Double refraction Polarization by double refraction Scattring of light Circular and elliptical polarization Formation colors in light polarized Study of crystals convergent tolight polarized		
27-30	8	Atoms,electrons and photons	Condition in gases Thermionic emission Photoelectric effect Line spectra Bohr atom Wave mechanism Apsorbition spectra The laser x-ray tube x-ray spectra	=	=

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	University physics/ Code LOPE 1202
Special requirements (include for example workshops, periodicals, IT software, websites)	Lectures are available on the http://www.uotechnology.edu.iq/dep-MechanicsandEquipment/index.htm
Community-based facilities (include for example, guest Lectures , internship , field studies)	- Conducting seminars.

13. Admissions

Pre-requisites	
Minimum number of students	No identification.
Maximum number of students	No identification.

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 and optoelectronics Engineering College
3. Course title/code	English Language/LOPE1103
4. Programme(s) to which it contributes	Laser and Optoelectronics Engineering Programs
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1ˢᵗ & 2ⁿᵈ semesters/Year
7. Number of hours tuition (total)	Two Hours / Week 2H X30W=60H/Year
8. Date of production/revision of this specification	4/7/2017
9. Aims of the Course	

The aims which can be achieved during teaching this course program are as follows:
5- Proceeding to the Student the benefits of studying English Language as Second language.
6- Giving Knowledge about using the Technical Terminologies in their studies.
7- Understanding of using the scientific English language in the Academic Program.
8- Giving Knowledge of how to write ,describe , typing the reports in English.

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 Scientific English language. A2. Proceeding the understanding the and Ideological philosophy of learning a second language besides the native language . A3. Proceeding knowledge and understanding of English applications in writing technical reports ,descriptions .
B. Subject-specific skills B1.Literatures B2. Tutorials B3. Conversation
Teaching and Learning Methods
5- Tutorials 6- Power point literatures by Data show Reviews.
Assessment methods
5- Examinations. 6- Quizzes. 7- Home works. 8- Tutorials and discussions.
C. Thinking Skills C1. Ability of speaking. C2. Certain discussion and conversation . C3. General information collection for different sources relating to the language teaching methods. C4. collection of data
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. Different group conversations. D2. new learning methods.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	2	Literature	Introduction to English language as second language	Lecture & p.p Show.	Examinations ,Quizzes,.
3-7	=	=	English study and learning skills	=	=
8-12	=	=	The seven habits of highly effective readers.	=	=
13-20	=	=	7 Rules to learn excellent real English language .	=	=
21-24	=	=	How to improve your English conversation ability.	=	=
25-27	=	=	How to Write an outline of Technical English report.	=	=
28-30	=	=	What is the TOEFL. (Important steps to know).	=	=

COURSE SPECIFICATION

This Course Specification provides the main features of the statics , dynamics, thermodynamics & fluid mechanics for the students of 1st year in Laser & 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 programme specification as Laser & Optoelectronics Engineering .

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser & Optoelectronics Eng. Dept.
3. Course title/code	Engineering Mechanics, LOPE 1205
4. Programme(s) to which it contributes	Applied Mechanical Engineering
5. Modes of Attendance offered	Full time- 2hr/week
6. Semester/Year	1st &2nd semester/ 1st year
7. Number of hours tuition (total)	60 hours
8. Date of production/revision of this specification	26-6-2017
9. Aims of the Course	

-Aims of the course are to graduates a qualified engineer's who they have theoretical experience in statics and Dynamics in engineering mechanics field.
- This unit of study aims to provide theoretical knowledge and principles of statics and Dynamics and the ability to analysis and solve the Engineering mechanics problems.

- Illustration and discussion the Main Theoretical Principles and improve the ability for team work.

- Understanding of using different methods to solve the same problem
- assure the accuracy in solving problems with out any approximation.

10· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Knowledge and Understanding
A1.Enabling student to get the knowledge and understanding of the theoretical principles of Engineering Mechanics.
A2. Understanding of Ideological philosophy of Engineering Mechanics and their applications.
A3. Understanding the knowledge of using Engineering Mechanics for different methods of solution in engineering applications.
A4. At the end of the year the student should be able demonstrate knowledge and understanding of the concepts, theory and application of Engineering Mechanics.

B. Subject-specific skills
B1.An ability to analyze the Engineering Mechanics problems in engineering field.
B2. An ability to identify, formulates, and solve Engineering Mechanics problems.
B3. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Teaching and Learning Methods

1-Lecture notes and classroom discussions.

2-Theoretical examples and applications.

3-Solving problems, quizzes and assessments.

Assessment methods

C. Thinking Skills
C1. An ability to apply knowledge of Engineering Mechanics.
C2. Investigation in engineering problems and find effective solutions for Engineering Mechanics problem.
C3. Ability to analysis and decision making for Engineering Mechanics problem.
C4. Ability to solving problems, survey, work collectively, leadership groups.

Teaching and Learning Methods

1-Examinations and questions in the classroom.
2- Home works & Quizzes.
3-Tutorials and discussions.
4- The assessment of this element is by written examination which enables each

student to demonstrate ability to analyses and solve new problems
Assessment methods
Test Quizzes Home work

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

D1.   Training on several Engineering Mechanics methods to solve the same problem.

D2. An ability for solving different Engineering Mechanics problems in work field.

D3. An ability to communicate effectively.

 D4. Recognition of the need for , and the ability to engage in life-long learning.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2hr	Theory ,Tutorial &discussion.	Introduction to Static	lecture	Feed back ,quizzes homework
2	2hr	=	Scalar & vector quantities	lecture	=
3	2hr	=	resolution of force into components.	lecture	=
4	2hr	=	Moment of a force about point	lecture	=
5	2hr	=	Location of a resultant	lecture	=
6	2hr	=	Couples	lecture	=
7	2hr	=	Centroid & center of area	lecture	=
8	2hr	=	Center of gravity	lecture	=
9	2hr	=	Equilibrium	lecture	=
10	2hr	=	Free body diagram	lecture	=
11	2hr	=	Moment of inertia	lecture	=
12	2hr	=	friction	lecture	=
13	2hr	=	Introduction to dynamics	lecture	=
14	2hr	=	equations of linear motion	lecture	=
15	2hr	=	Displacement ,velocity & acceleration	lecture	=
16	2hr	=	Motion of projectile	lecture	=
17	2hr	=	Introduction to thermodynamics	lecture	=
18	2hr	=	1st law of thermodynamics	lecture	=
19	2hr	=	2nd law of thermodynamics	lecture	=
20	2hr	=	Types of processes	lecture	=
21	2hr	=	Types of processes	lecture	=
22	2hr	=	Types of energy	lecture	=
23	2hr	=	Heat balance	lecture	=
24	2hr	=	Introduction to fluid mechanics	lecture	=
25	2hr	=	Ideal gas	lecture	=
26	2hr	=	Euler equation	lecture	=
27	2hr	=	Bernoulli equation	lecture	=
28	2hr	=	Momentum equation	lecture	=

29	2hr	=	Force exerted by flowing fluid on a pipe-bend.	lecture	=
30	2hr	=	Exam.	-	

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1-Engineering Mechanics, Volume 1,Statics & Dynamics , Fifth Edition by J.L. Meriam & L.G. Kraige 2-Engineering Mechanics, Singer. 3-Lecture notes.
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

TEMPLATE FOR COURSE SPECIFICATION

> HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

> This Course provides a basic principle of engineering drawing including word and numbering drawing, dimensions, sections, projections and isometric drawing

1. Teaching Institution	University of Technology
2. University Department/Centre	Dep. of Laser and optoelectronics Engineering
3. Course title/code	Engineering drawing /LEOP1206
4. Programme(s) to which it contributes	Laser and optoelectronics Eng. Programs
5. Modes of Attendance offered	Full Time
6. Semester/Year	1st &2nd semesters/ year
7. Number of hours tuition (total)	3hours/week 3H*30W=90H/Year
8. Date of production/revision of this specification	4-7-2017
9. Aims of the Course	
- Introduction of Engineering drawing for students of the First	
- Use of drawing tools, starting engineering drawing learning students the basic principles.	
- The application of the basic principles of engineering drawing	

10· Learning Outcomes, Teaching ,Learning and Assessment Methods

A- Knowledge and Understanding
A1. Know the methodology of engineering drawing.
A2. Enable the student to draw A3. Enable the student to learn and understand the basic for drawing word and numbering drawing, dimensions, sections, projections and isometric drawing

B. Subject-specific skills
B1. Learn student how to have skill to draw word and numbering , dimensions, sections, projections and isometric drawing

Teaching and Learning Methods

Theoretical and experimental method

Assessment methods

- Classroom discussions and to identify the potential of the student to draw.
  - Homework.
  - Sudden exams.
  - Quarterly examinations.
  - Projects and seminars.
  - The student's performance in the class .

C. Thinking Skills
C1. Description of projections
C2. Description of writing and numbering on sheet.
C3. Description of Isometric drawing .

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 draw in engineering drawing .

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-4	4 hours per week	Introduction in engineering drawing , using drawing tools, drawing letters and number	Introduction and discussing drawing tools	Theoretical and experimental .	Discussions. Homework. Sudden exams. Quarterly examinations. Projects and seminars.Laboratories.
5-9	4 hours per week	Obtaining Projection and sections	projections	=	=
10-13	4 hours per week	Hand drawing and dimensions	Hand drawing	=	=
14-17	4 hours per week	isometric drawing	Isometric drawing	=	=
18-21	4 hours per week	Engineering drawing using Autocad , setup, repare, basic operation tools.	Auto cad	=	=
22-25	3 hours per week	Tool definition , draw modify,layers,properties,utilities, block	Auto cad 2010	=	=

26-30	3 hours per week	Two and three dimentional drawings.	Autocad	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Engineering drawing Abdal Rasool Al khafaf. Auto cad 2010 tutorials
Special requirements (include for example workshops, periodicals, IT software, websites)	Autocad 2010 tutorial
Community-based facilities (include for example, guest Lectures , internship , field studies)	- Conducting seminars. - Visits to internent sites.

13. Admissions	
Pre-requisites	Pass the secondary school. In addition, students have the capacity to communicate in English.
Minimum number of students	No identification.
Maximum number of students	No identification.

COURSE SPECIFICATION

This course acquaints students of 1ˢᵗ Year with the design, development, testing and documentation of C++ programming language. Data structure (variables, arrays, structure, and pointer), conditional and repetition statements, functions, files, graphics, math, string, dos functions, and I/O interface.

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser and optoelectronics Eng. Dept.
3. Course title/code	C++ Computer Programming / LOPE1107
4. Programme(s) to which it contributes	Laser and optoelectronics Eng. programs
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	Annual (1ˢᵗ &2ⁿᵈ Semester / Year)
7. Number of hours tuition (total)	Two Hours / Week (Theory) Two Hours / Week (Practical) 2H X30W=60H/Year theory +60H/Year practical
8. Date of production/revision of this specification	24/06/2017
9. Aims of the Course	

The aims which can be achieved during teaching this course program are as follows:

-Giving knowledge about the computer hardware & software

-Understanding of programming in C++ programming language

10· Learning Outcomes, Teaching ,Learning and Assessment Method
A- Knowledge and Understanding A1. Create a program using the C++ programming language A2. Use sequential looping, control logic and graphic in programs A3. Solving problems in different applications
B. Subject-specific skills B1.Literatures B2. Computer Laboratory.
Teaching and Learning Methods
1-Computer Laboratory. 2- Power point literatures by Data show Reviews.
Assessment methods
1- Examinations. 2- Quizzes. 3- Home works.
C. Thinking Skills C1. Reports. C2. Home works . C3. Research
Teaching and Learning Methods
1- Literatures. 2- Applications in computer laboratory .
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) D1. Apply Solution of different examples . D2. Training to write programs for different applications. D3. Training to draw football and Tanis playing ground using graphic statements.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	2+2	Literature and Experiments	Introduction to C++ Programming Language, Constants and Variables	Lecture & p.p Show.	Examinations ,Quizzes, and Reports.
3-4	=	=	**Operators** :Arithmetic Operators, Bitwise Operators, Input/ Output technique, Relational operators (< ><= and >=) , Equality operators, Conditional operator (? :), Comma punctuator and operator (,)	=	=
5-8	=	=	**Conditional statements:** The if statement (keyword), If/else if/ else statement, The switch statement, Menu.	=	=
9-12	=	=	**The iteration (looping) statement :** (if with counter)For (keyword), While (keyword), Do…while loop, Break , Continue,	=	=
13-18	=	=	**Data structure:** Math. Functions, One Dimensional Arrays, Strings, Two dimensional array, Squared array, Structures, Pointers	=	=
19-25	=	=	**Functions:** Arrays, Pointers, Structures as function parameters, Local and Global Variables, Dynamic memory allocation	=	=
26-30	**=**	**=**	**Text Files and Graphics**, Applications on Graphics, I/O Interface	**=**	**=**

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	C++ manual, Help, and lectures prepared by the teacher.
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.

PROGRAMME REVIEW : Optoelectronics Eng.

COURSE SPECIFICATION: Human rights, 1st   year

The course covers the concept of human rights and development, definition , classes , properties , and the most important human rights conventions and declarations and international conventions on human rights , and human rights in religions and the role of non-governmental organizations in this field and other human rights issues.

   The substance of freedom and democracy include the concept of freedom and kinds , democracy and the types and components , individual liberty and freedom forced to reconcile the sovereignty, freedom , democracy during the Greeks time , lobbyists , the most important theories on the nature of election , the rights of minorities in democratic governance and other topics that make the student familiar with the issues of human rights , freedom and democracy and contemporary develop his ability analysis of issues and diagnose problems at the local level and the regional and international levels

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser and Optoelectronics Engineering department
3. Course title/code	Human rights /
4. Programme(s) to which it contributes	General
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st&2ndSemester / Year

7. Number of hours tuition (total)	Thirty Hours 1H X 30Week =30h/year
8. Date of production/revision of this specification	4/7/2014

9. Aims of the Course

The aims which can be achieved during teaching this course program are as follows:
1. Working to promote, disseminate and consolidate the culture of human rights , freedom and democracy among university students.
2. Promising d conscious generation and cultured human rights issues , freedom and democracy and believes in political pluralism and the peaceful transfer of medium- and freedom of expression and respect for and acceptance of the other opinion and respect for minority rights and peaceful coexistence in society .
3. Ability to diagnose human rights violations or restrict public freedoms or overtaking on the Constitution and the ability to propose realistic solutions to the problems of the community to achieve a peaceful coexistence in society .
4. Inform students on the experiences of past and contemporary Nations in the field of human rights , freedom and democracy of worldviews , humane and scientific , religious and objectively away from the effects of political, intellectual and religious .
5. Seeking to bring about a change in the student's behavior in line with the overall objective by directing attention to the implications of the real human rights and the dimensions of the legal and the study of international declarations and covenants , and the impact of the violations egregious to those rules , which affect the lives of people or their dignity , especially that human rights are inclusive and all human societies .

10· Learning Outcomes, Teaching ,Learning and Assessment Method

B-   Knowledge and Understanding
A 1 - to identify the concepts of human rights , freedom and democracy
A 2 - to know and understand the most important terms that relate to the subject of human rights , freedom and democracy.
A 3 - to know and understand the principles and theories on human rights , freedom and democracy.
A 4 - to know and understand the most important announcements and international charters and conventions on human rights , freedom and democracy.
A 5 - to identify the key role of human rights issues , freedom and democracy in the stability of human societies.
A 6 - to know and understand the importance of employing the concepts of   human rights , freedom and democracy in public life , whether at home ,   school , university , work , street , factory .... etc. especially with the   worldview of modern issues of human rights , freedom and democracy .

B. Subject-specific skills

B 1 - the most important acquisition of the student terminology, principles and theories on human rights, freedom and democracy .
B-2 - the ability to debate and interpretation, analysis and comparison of the issues or the subjects on human rights, freedom and democracy, particularly in relation to the experiences of nations in this field .
B-3 Ability to summarize the issues and do rewrite the subject manner of its student .

B- 4 The ability to search and collection, arrangement and classification of information when conducting research and writing scientific reports and do activities and exercises and participation of various activities.

Teaching and Learning Methods
Method of lecture and discussion , preparation and effective participation of tribal, stirring diverse Questions for discussion, arrangement and discuss ideas, individual and collective debates between students, cooperative learning, how to do household duties Research - Abstracts - Posters, film screenings and educational presentations.

Assessment methods
Exam calendar, exam daily, monthly exam, attendance and active participation of students, providing research - summaries - Mural - Posters.

C. Thinking Skills
C 1 - Critical Thinking
C 2 - problem solving, brainstorming
C 3 - Case Study
C 4 - study skills

Teaching and Learning Methods
Way discussion, provoke questions and diverse ideas, research work and scientific reports, dialogue and debate between individual and collective student, individual and collective training to students, film screenings and educational presentations.

Assessment methods
Exam sudden, daily and monthly examinations, oral examinations variety of questions, participate effectively in the classroom, 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 - the ability to throw and apply for different subjects . D 3 - to doing the work of different reports - summaries - Posters - 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	1	Lecture	concept of human rights and development of historic	Recognize the concept of human rights and development of historic	Exam and participation in the subject matter
2	1	Lecture	of the right to language and terminology and definition and characteristics of human right	Knowledge and understanding of the meaning of the right to language and terminology and definition and characteristics of human rights	Exam and participation in the subject matter
3	1	Lecture	type of human rights in the community	Knowledge and understanding of the importance of each type of human rights in the community	Exam and participation in the subject matter
4	1	Lecture	human rights in religions	Identify the implications of human rights in religions	Exam and participation in the subject matter
5	1	Lecture	human rights in religions	Identify the implications of human rights in religions	Exam and participation in the subject matter
6	1	Lecture	the regional human rights mechanisms and their application	Identify the terms of the agreements in the regional human rights mechanisms and their application	Exam and participation in the subject matter
7	1	Lecture	of human rights in international law and the extent to which	Identified on the basis of human rights in international law and the extent to which	Exam and participation in the subject matter
8	1	Lecture	human rights and public rights of persona	Comparison between human rights and public rights of persona	Exam and participation in the subject matter
9	1	Lecture	the stages of the international recognition of human rights	Identify the stages of the international recognition of human rights	Exam and participation in the subject matter
10	1	Lecture	non-governmental organizations and the defense of human rights	Identification of non-governmental organizations and the defense and diagnosis of human rights violations in the world and the mechanisms of action	Exam and participation in the subject matter
11	1	Lecture	non-governmental organizations and the defense of human rights	Identification of non-governmental organizations and the defense and diagnosis of human rights violations in the world and the mechanisms of action	Exam and participation in the subject matter
12	1	Lecture	content of the most important civil rights	Knowledge and understanding of the	Exam and participation in the subject matter

				content of the most important civil rights	
13	1	Lecture	content of the most important civil rights	Knowledge and understanding of the content of the most important civil rights	Exam and participation in the subject matter
14	1	Lecture	guarantees for the exercise of the rights and public freedoms in national legislation	Knowledge of the most important guarantees for the exercise of the rights and public freedoms in national legislation	Exam and participation in the subject matter
15	1	Lecture	the rights of the social strata, especially	Knowledge of the importance of the rights of the social strata, especially	Exam and participation in the subject matter

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	1	Lecture	the term public freedoms	Knowledge and understanding of the term public freedoms	Exam and participation in the subject matter
2	1	Lecture	the historical development of the rights and freedoms	Knowledge and understanding of the historical development of the rights and freedoms	Exam and participation in the subject matter
3	1	Lecture	public freedoms kinds	Know the meaning of public freedoms kinds	Exam and participation in the subject matter
4	1	Lecture	democracy	Identify the meaning of democracy	Exam and participation in the subject matter
5	1	Lecture	types of democracy	Knowledge of the most important types of democracy and the comparison between the kinds of	Exam and participation in the subject matter
6	1	Lecture	advantages and characteristics and conditions of democracy	Identify the advantages and characteristics and conditions of democracy	Exam and participation in the subject matter
7	1	Lecture	of individual freedom and liberty coercive	Know the meaning of individual freedom and liberty coercive	Exam and participation in the subject matter
8	1	Lecture	the state and the rights of sovereignty, freedom	Knowledge about the state and the rights of sovereignty, freedom	Exam and participation in the subject matter
9	1	Lecture	reconcile the sovereignty and freedom	Knowledge of how to reconcile sovereignty and freedom	Exam and participation in the subject matter
10	1	Lecture	the historical dimension of democracy	Recognize the historical dimension of democracy	Exam and participation in the subject matter

	1	Lecture	pressure groups	Identify the influence of pressure groups in society	Exam and participation in the subject matter
11					
12	1	Lecture	pressure groups	Identify the influence of pressure groups in society	Exam and participation in the subject matter
13	1	Lecture	components of democracy	Identify the most important components of democracy	Exam and participation in the subject matter
14	1	Lecture	components of democracy	Identify the most important components of democracy	Exam and participation in the subject matter
15	1	Lecture	the minorities and their participation in democratic governance	Know the meaning of the minorities and their participation in democratic governance	Exam and participation in the subject matter

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	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.

TEMPLATE FOR COURSE SPECIFICATION

Second stage

PROGRAMME REVIEW   Optoelectronics Eng. 2nd year

COURSE SPECIFICATION: Mathematics(II)

This Course Specification provides the main features of the Theory of Mathematics for the students of 2nd year in optoelectronics Engineering. Learning outcomes which gained by this course will help a typical student to achieve and   demonstrate the learning opportunities that are provided during the course study and to comply with the programme specification as optoelectronics Engineering.

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser and Optoelectronics Engineering Dept./ Optoelectronic Engineering
3. Course title/code	Mathematics (II) / LOPE2201
4. Programme(s) to which it contributes	Laser and Optoelectronics programs
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semester / Year
7. Number of hours tuition (total)	Three Hours / Week 3H X30W=90H/Year
8. Date of production/revision of this specification	15/7/2017
9. Aims of the Course	

The aims which can be achieved during teaching this course program are :
    1- Giving knowledge about using the mathematical theories in their studies.
    2- Provides the mathematical methods which can be used in laser and optoelectronics theory and applications.
    3- Provide students with experiences that will assist them in solving the scientific problems.	

10· Learning Outcomes, Teaching ,Learning and Assessment Methode
A- Knowledge and Understanding A1. Enabling student to get the knowledge and understanding of the theoretical principles of mathematics. A2. Proceeding the understanding to how solve the mathematical problems of the laser or optoelectronic concepts.
B. Subject-specific skills B1.Literatures B2. Tutorials B3. Conversation
Teaching and Learning Methods
1- Tutorials 2- Literatures.
Assessment methods
1- Examinations. 2- Quizzes. 3- Home works.
C. Thinking Skills C1. Ability of understanding mathematics concepts. C2. Certain discussion and conversation. C3. General information collection for different sources relating to the mathematical 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. Different group conversations. D2. New learning methods.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Literature	Partial derivative of function of two or more independent variable	Lecture	Examinations, Quizzes.
2	=	=	The Chain rule - Directional derivative and Gradient vectors	=	=
3	=	=	Tangent planes and norma lines	=	=
4	=	=	Maxima; Minima; and saddle points for function with two variables	=	=
5	=	=	Vectors in the plane - Cartesian coordinate and vector in space	=	=
6	=	=	Dot product and Cross product of two vectors	=	=
7	=	=	Line and planes in space	=	=
8	=	=	Applications	=	=
9	=	=	Polar coordinates and graphing in polar coordinate	=	=
10	=	=	Arc length, Area, and surface area	=	=
11	=	=	Double Integral - Area, moment, and centers of mass	=	=
12	=	=	Double integral in polar form	=	=
13	=	=	Applications	=	=
14	=	=	Triple integral	=	=
15	=	=	Triple integral in cylindrical and spherical coordinate	=	=
16	=	=	Preview of differential equations - Separable first order equation	=	=
17	=	=	Homogeneous differential equation - Linear first order differential equation	=	=
18	=	=	Second order homogeneous linear equation	=	=
19	=	=	Second order non homogeneous linear equation	=	=
20	=	=	Infinite Series.	=	=
21	=	=	Ratio test. - Root test of the series.	=	=

22	=	=	Power series. - Taylor series and Maclaurin Series.	=	=
23	=	=	Solving differential equation by power series	=	=
24	=	=	Special Function Gama and Beta function	=	=
25	=	=	Applications	=	=
26	=	=	Fourier series.	=	=

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Literatures in mathematics for engineering students.
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.
Minimum number of students	No limit.
Maximum number of students	No limit.

COURSE REVIEW: Laser Principles

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 and Optoelectronics Eng, Dept.
3. Course title/code	Laser Principles
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)	2hours (Theory)/Week+2 hours (Practical)/Week 2H*30Weeks=(60H+60H) / Year
8. Date of production/revision of this specification	26 / 10 /2016
9. Aims of the Course	
1-Demonstrating concepts and principles of the laser for students of the second Year for both of laser and optoelectronics Engineering programs	
2- Describing the physical properties of laser and specifications as well as addressing all kinds of lasers	
3- Preparing the students theoretically and practically in the field of competence of the planned public sector companies and private sector	

10· Learning Outcomes, Teaching ,Learning and Assessment Methods
A- Knowledge and Understanding A1. Understanding the laser theory A2. To get knowledge about the laser generating and application. A3. Acquiring information about laser radiation properties. A4. Design different types of laser systems A5. Classification of Laser types and operation concepts.
B. Subject-specific skills B1. B2. B3.
Teaching and Learning Methods
Assessment methods
C. Thinking Skills C1. C2. C3. C4.
Teaching and Learning Methods
Assessment methods

D. General and Transferable Skills (other skills relevant to employability and personal development) D1. D2. D3. D4.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-4	8 - hours per week (4 hours theoretical +4 hour practic (al	- Spontaneous emission + stimulated emission + absorption + relationship Einstein + feedbacl	laser concepts	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	.Discussions - .Homework .Sudden exams Quarterly .examinations Projects and .seminars Laboratory
5-9	hours per week (2 hours theoretical +4 hour practical (	- Properties of the laser beam items + + Laser stimulation operations + feedback + examples of the types of lasers	laser system -	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	.Discussions - .Homework .Sudden exams Quarterly .examinations Projects and .seminars Laboratory
10-13	hours per week (2 hours theoretical +4 hour practical (	Laser modes +standing wave +longitudinal mode + transvers s	Laser modes	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	.Discussions - .Homework .Sudden exams Quarterly .examinations Projects and .seminars Laboratory
14-17	hours per week (2	- Coefficient of	Patterns of - transverse	Motivate the student to develop his	.Discussions - .Homework .Sudden exams

	hours theoretical +4 hour practical (	profit threshold + control the number of laser modes + shapes own modes of electromagnetic transverse		abilities in data analysis question and diagnose the problem and describe the solution	Quarterly examinations. Projects and seminars. Laboratory
18-28	hours per week (2 hours theoretical +4 hour practical (	The - distribution of the electric field pattern Browser + Stability, laser systems of its own terms + cavities	Laser stability	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	- Discussions. Homework. Sudden exams. Quarterly examinations. Projects and seminars. Laboratory

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	"Orazio svelto "principle of laser"
Special requirements (include for example workshops, periodicals, IT software, websites)	- Lectures are available on the http://uotechnology.edu.iq/dep-laserandoptoelec-eng/branch/branch2.htm

Community-based facilities (include for example, guest Lectures , internship , field studies)	Conduct experiments in laboratories Hold seminars Summer Training

13. Admissions	
Pre-requisites	The success of the second first and good in English language
Minimum number of students	
Maximum number of students	

COURSE REVIEW: **Electrical A.C. Circuits 2nd year**

This Course Specification provides the main features of the Theory of Fundamental of Electric A.C. circuit for the students of second year in Laser and 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 programmed specification as electromechanical systems Engineering.

1. Teaching Institution	University of Technology
2. University Department/Centre	Optoelectronics and laser Engineering
3. Course title/code	Electrical A.C. Circuit /LOPE 2203
4. Programmers(s) to which it contributes	Bsc. Optoelectronic and Laser engineering
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semester / Year
7. Number of hours tuition (total)	Theoretical / Branch : 2hrs / w Practical / Branch : 2 hrs / w Total: 2*30=60H/Year+60h/Year
8. Date of production/revision of this specification	5/7/2017

9. Aims of the Course

The aims which can be achieved during teaching this course program are as follows:

1-Ilustration and discussion the fundamental of A.C. electric engineering and definition.

2- Concentration on series, parallel, series-parallel, Resonance, Locus diagram circuits.

3-Identify the equations voltages & current for circuits above.

4- Illustration and discussion the analysis methods of the above Circuits, delta-star, Branch, loop, nodal.

5- Illustrations and discussion the Network theorems, super position, Thevenin's theorem, Norton theorem .maximum power transfer.

6- discussion the fundamental of the Electric Filters.

7- Illustration and discussion the Power in AC Electrical Circuits.

8- Illustration and discussion the Magnetic Circuits.

10· Learning Outcomes, Teaching ,Learning and Assessment Method
A- Knowledge and Understanding A1.Enabling student to get the knowledge and understanding the fundamental of A.C. circuit engineering for different circuits. A2. Enabling student to analysis different electrical circuits by analysis methods. A3. Enabling student to get the knowledge and understanding the network methods for different electrical circuits.
B. Subject-specific skills B1.Literatures B2. Tutorials B3. Laboratory and performing some Experiments.
Teaching and Learning Methods
1-Practical experiments. 2- Simulation and Innovation. 3- Pdf literatures by Data show Reviews.
Assessment methods
1-Examinations. 2-Quizzes. 3- Home works. 4- Tutorials and discussions.
C. Thinking Skills C1. Reports. C2. Certain Electric Engineering problem analysis. C3. Technical information collection for Electric Engineering problem. C4. Research and collection data.
Teaching and Learning Methods
1-Literatures. 2- Tutorials. 2- Experiments.
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)**
D1. Solution of different circuits of Electric Engineering systems.
D2.Analaysis of different circuits of Electric Engineering by analysis methods.
D3. Solution of different circuits of Electric Engineering systems by network theorems.
D4. Simulation of different system of Electric Engineering methods.
D5. Training on some software package programs related to the program.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-5	2 Theoretical + 2 Practical	Literature , Experimental,	Complex Representation of voltage and current, Complex impedance and admittance. Complex power, Series parallel Circuits, phasor diagram	Lecture & pdf Show.	Examinations ,Quizzes, and Reports.
6-18	=	=	Series resonance, Parallel resonance, Locus diagrams, Solution of AC. Circuit, maximum power transfer,	=	=
19-30	=	=	Magnetically coupled circuit, Two port Network, Electric Filter.	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1-Literatures in different kinds of Electric Engineering circuits 2.Introductory circuit Analysis; by Robert L. Boylestad . 3-Basic Electrical Engineering science; by Mckenzie smith and K.T. Hosie
Special requirements (include for example workshops, periodicals, IT software, websites)	-
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.

COURSE SPECIFICATION

This Course Specification provides the main features of the Theory of electronics for the students of 2nd year in optoelectronics engineering. Learning outcomes which gained by this course will help a typical student to achieve and   demonstrate the learning opportunities that are provided during the course study and to comply with the course specification as optoelectronics Engineering.

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser and Optoelectronics Engineering Dept.
3. Course title/code	Electronics (I) / LOPE2204
4. Programm(s) to which it contributes	Laser & Optoelectronics Eng. Programs
5. Modes of Attendance offered	Full Hours
6. Semester/Year	1st &2nd Semester / Year
7. Number of hours tuition (total)	four Hours / Week (2hours theory ,2 hours application) 4H X30W=120H/Year
8. Date of production/revision of this specification	5/7/2017

9. Aims of the Course

The aims which can be achieved during teaching this course are as follows:
   - Introduction of advanced concepts in electronics devices and circuits for students of the Second year in both branches, such as diodes, transistors and complex circuits of specific function.
   - Theoretical and experimental preparation of students to gain knowledge of electronics physics.
   - Scientific applications and uses of electronic devices in current days.

10· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding

A1. Know the physics of semiconductor materials and operation, properties and applications of the diode.

A2. Enable the student to use mathematical equations of the diode and know the types of diodes with applications such as Zener diode etc.

A3. Enable the student to learn and understand the basic characteristics of Transistors and its operation and explain their structures, advantages and drawbacks.

A4. Enable the student to learn and understand the mathematical principles of using equation in order to find the value of transistor current and voltage.

A5. Diode and Transistor biasing methods and their function within circuit.

B. Subject-specific skills

Skills in electronic subject include studying and gain knowledge of semiconductor characteristics of diodes and transistors with their applications. In addition to how students can analyze the electronics circuits mathematically and schematically to find the output signal and what are the changes on it. Further to studying the h-parameters of the transistor.

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.
  - First semester exam (20%).
  - Second semester exam (20%).
  - Home work and quizzes (10%).
  - Final exam (50%).

C. Thinking Skills

C1. Description of diode I-V characteristics.

C2. Description of rectifier and amplifier work.

C3. Description of diode and transistor characteristics with different biasing methods.

C4. Understanding the Transistor operation.

C5. Describe the applications of modern electronic circuit and its importance in engineering topics.

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
1-8	4 hours per week (included lab time)	Knowledge and Understanding – Specific Skills –Thinking methods	- Introduction to Semiconductors – PN junction – Diode types	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.
9-15	4 hours per week (included lab time)	Knowledge and Understanding – Specific Skills – Thinking methods	Transistor – Transistor types – Transistor characteristic – load line – Transistor biasing	=	=
16-23	4 hours per week (included lab time)	Knowledge and Understanding – Specific Skills – Thinking methods	-Transistor - h-parameters – Amplifiers – Amplifier applications – FET – JFET biasing	=	=

24-30	4 hours per week (included lab time)	Knowledge and Understanding – Specific Skills – Thinking methods	Digital Electronics	=	=

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	- Electronic Circuits - Theraja - Electronic Circuits - Millman
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 from last stage (year).
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	Laser and Optoelectronics Engineering College
3. Course title/code	Geometrical Optics
4. Programme(s) to which it contributes	Laser & Optoelectronics Programme
5. Modes of Attendance offered	Full Time
6. Semester/Year	1st & 2nd semesters / year
7. Number of hours tuition (total)	2Hours / Week 2*30=60Hours / year
8. Date of production/revision of this specification	8/9/2016

9. Aims of the Course
1. The student should understand the theories of light and their applications in optical instruments.
2. This course is intended for engineers, scientists, and managers who are developing, specifying, or purchasing optical, electro-optical, and infrared systems. An introduction to geometrical optics for first semester and physical optic for second semester.
3. Identification of aberration occurring in optical systems.
4. Understanding the mechanism of interferometry instruments by students.

10· Learning Outcomes, Teaching ,Learning and Assessment Method
   B- Knowledge and Understanding
A1. Reflection and Refraction equations of mirror and lens.
A2. Matrix methods in paraxial optics.
A3. Aberration.
A4. Superposition of waves.
A5. Interference.

B. Subject-specific skills
B1. The student has to recognize nature of theories of light.
B2. To be able to interpret reflection of spherical waves on different surfaces.
B3. To recognize operation of different kinds of lenses and their application
Teaching and Learning Methods
1. Lectures 2. Practical 3. Simulation programs and problem solving
Assessment methods
1. Student understand to the lectures evaluation semester activities including classroom interaction and Quizzes. 2. Practical skills by practical evaluation 3. The ability of student to acquire evaluation oral exam 4. Student achievement evaluation final exam
C. Thinking Skills To be able to interpret reflection of light at plane surfaces from both points of view of corpuscular and wave theories.
Teaching and Learning Methods
1. Lectures 2. Practical 3. Simulation programs and problem solving
D. General and Transferable Skills (other skills relevant to employability and personal development) D1. The student has to recognize nature of theories of light. D2. To be able to interpret reflection of spherical waves on different surfaces. D3. To recognize operation of different kinds of lenses and their application

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	5		**Wave Optics:** Wave nature of light **Geometrical Optics:** Basics of light and light propagation	Lectures, tutorials and practical	Examination, Reports, Quiz
3-4	5		**WO:** Wave nature of light **GPO:** Refraction at plane Surfaces, lens, mirrors and Prism	Lectures, tutorials and practical	Examination, Reports, Quiz
5-7	5		**WO:** Superposition of waves **GPO:** lens, mirrors and Prism Refraction at Spherical Surfaces	Lectures, tutorials and practical	Examination, Reports, Quiz
8-10	5		**WO:** Interference **GPO:** Refraction at Spherical Surfaces	Lectures, tutorials and practical	Examination, Reports, Quiz
11-13	5		**WO:** Interference **GPO:** Thin Lenses	Lectures, tutorials and practical	Examination, Reports, Quiz
14-16	5		Aberration	Lectures, tutorials and practical	Examination, Reports, Quiz
17-20	5		Superposition of waves.	Lectures, tutorials and practical	Examination, Reports, Quiz
21-24	5		Interference.	Lectures, tutorials and practical	Examination, Reports, Quiz
25-28	5		Interferometry instrument	Lectures, tutorials and practical	Examination, Reports, Quiz
29-30	5		Geometrical Practices	Lectures, tutorials and practical	Examination, Reports, Quiz

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Introduction to Optics, *Frank L. Pedrotti, and Leno S. Pedrotti, 2ⁿᵈ Ed., ISBN(0-13-501545-6)*
Special requirements (include for example workshops, periodicals, IT software, websites)	

Community-based facilities (include for example, guest Lectures , internship , field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

COURSE REVIEW: Visual Basic Programming	

COURSE SPECIFICATION

This course acquaints students of 2nd Year with the design, development, testing and documentation of Visual BASIC programs. Visual BASIC's object oriented event driven (OOED) interface is used to program sequential, conditional, and repetition structures. Multiple objects and control arrays are used to gather input. Sequential data files are created and accessed in Visual BASIC programs.

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser and Optoelectronics Engineering Dept.
3. Course title/code	Visual Basic Programming /LOPE2206
4. Programme(s) to which it contributes	General
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semesters / Year
7. Number of hours tuition (total)	1 Hour / Week (Theory) 2 Hours / Week (Practical) 1H X30W=30H/Year(Theory) +60H (practical)
8. Date of production/revision of this specification	6/7/2017
9. Aims of the Course	
The aims which can be achieved during teaching this course program are as follows:	
1- Giving knowledge about the computer hardware & software 2- Understanding of programming in Visual Basic	

10· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding
   A1. Create a program using the VB development environment
   A2. Use sequential looping & control logic in programs
   A3. Solving problems in different applications

B. Subject-specific skills
  B1.Literatures
  B2. Tutorials
  B3. Computer Laboratory.

Teaching and Learning Methods
1-Computer Laboratory.   2- Power point literatures by Data show Reviews.
Assessment methods
1- Examinations. 2- Quizzes.   3- Home works.

C. Thinking Skills
  C1. Reports.
  C2. Home works .
  C3. Research

Teaching and Learning Methods
1- Literatures. 2- Applications in computer laboratory .
Assessment methods
1-Test 1   2- Test 2. 3- Quizzes and Assignments. 4- Laboratory. 1- Final Examination

D. General and Transferable Skills (other skills relevant to employability and personal development) D1. Solution of different examples . D2. Training to write flow charts for different applications. D3. Training to build a projects in real world for examples supermarket . D4.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	6	Literature and Experiments	**Computer Hardware & Software**	Lecture & p.p Show.	Examinations ,Quizzes, and Reports.
3-4	=	=	**Binary System & Logical Gates**	=	=
5-8	9	=	**Algorithms & Flow Charts**	=	=
9-12	=	=	**Working with Visual Basic Window Components:** Menu Bar, Tool Bar, Project Explorer Window, Form Layout Window, properties Window, Toolbox	=	=
13-18	15	=	**Working with Forms: Properties, Events, Methods Working with Basic Controls:** Label, Command Button, Text Box, Option Button, Frame, Check Box, List Box, Combo Box, Image, Scroll, Picture, Timer, Drive List Box, Dir List Box, File List Box and Shape Controls.	=	=
19-25	18	=	**Basic Programming Fundamentals:** Variables, Data types, Constant, Conversion Function. Scope of Variable: Public, Private Static. Operators: Logical, Arithmetic, Concatenation, Comparison. Decision Structure: If.. Then, If..Then..Else, Select Case.. End Case. Loop Structure: Do..While, For.. Next,	=	=
26-30	12	**=**	**One & Two Dimensional Array**	**=**	**=**

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	- Computer Science, Dr. Balagurusamy E, 2005 -Visual Basic 6 , Made Easy, D.Liew Voon Kiong, 2006 -Visual Basic , Dr. Abdul Mutalib, 2004
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 (first year).
Minimum number of students	No limit.
Maximum number of students	No limit.

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: **Electromagnetic Fields for second year**

COURSE SPECIFICATION

This Course Specification provides the main features of the Electromagnetic Fields for the students of 2nd year. 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 programme specification as Laser &Optoelectronics Engineering.

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser &optoelectronics Engineering Dept.
3. Course title/code	Electromagnetic fields / LOPE 2207
4. Programme(s) to which it contributes	Laser & Optoelectronics Engineering Programs
5. Modes of Attendance offered	Actual classroom learning- interactive Full Hours
6. Semester/Year	1st &2nd Semester / 2014
7. Number of hours tuition (total)	2 Hours / Week Total =60H
8. Date of production/revision of this specification	8/05/2017
9. Aims of the Course	
The overall goals of the course are to develop student proficiency in:	
I. Gaining factual knowledge (terminology, classifications, and methods) in the area of Electromagnetic fields	
2. Learning fundamental principles, generalization or theories concerning the basic area of Electromagnetic fields.	
3. Learning to apply a background in physics and math and to improve engineering problem solving.	
4. Developing skill in communicating engineering solutions both orally and in writing	

10· Learning Outcomes, Teaching ,Learning and Assessment Methode
A1.Enabling student to get the knowledge and understanding of the theoretical principles of Electromagnetic Fields. A2. Understanding of Ideological philosophy of Electromagnetic Fields and their applications. A3. Understanding the knowledge of Electromagnetic Fields for different methods of solution in their applications. A4. At the end of the year the student should be able demonstrate knowledge and understanding of the concepts, theory and application of Electromagnetic Fields
B. Subject-specific skills B1.An ability to analyze the Electromagnetic Fields problems. B2. An ability to identify, formulates, and solves Electromagnetic Fields problems. B3. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
Teaching and Learning Methods
- Include theoretical lectures and the Practical experiments. - The implementation of reports by student and monitoring by supervisors
Assessment methods
-General or Central Examinations in scientific Dept. -Quizzes. -Home works. -Tutorials and discussions
C. Thinking Skills C1. Reports. C2.Problem analysis depending on theoretical in formations. C3. Decisions making for solve problems. C4. Working together as groups.
Teaching and Learning Methods
-Literatures. -Using the blackboard as basic way for learning. -Using Al Data- Show for presentation of material.
Assessment methods
-First semester exam (15%). -Second semester exam (15%). -Home work and quizzes (10%). -Final exam (60%).

D. General and Transferable Skills (other skills relevant to employability and personal development) D1. The ability to throw and apply for different subjects . D 3 - To doing the work of different reports - summaries D2. Examinations.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
Week 1	2	Literature and Experimental	Vector notation Vector algebra Coordinate system	Lecture	Examinations ,Quizzes, and Reports Training.
Week 2	2	=	Differential value Vector field	=	=
Week 3	2	=	Transformation coulombs law	=	=
Week 4	2	=	Electric field Distributions	=	=
Week 5	2	=	Standard charge configuration	=	=
Week 6	2	=	Net charge in a region Electric flux	=	=
Week 7	2	=	Flux density gausss law	=	=
Week 8	2	=	Relation between flux and density electric flux	=	=
Week 9	2	=	divergence	=	=
Week 10	2	=	Divergence in Cartesian Coordinates	=	=
Week 11	2	=	Divergence of D	=	=
Week 12	2	=	The del operator	=	=
Week 13	2	=	The del operator	=	=
Week 14	2	=	The divergence theory	=	=
Week 15	2	=	The divergence theory	=	=
Week 16	2	=	Work done in moving point charge	=	=
Week 17	2	=	Electric potential	=	=
Week 18	2	=	Potential of a charge Distribution Gradient	=	=
Week19	2	=	Relationship between E and V	=	=
Week 20	2	=	Charge in motion Convection current density	=	=
Week 21	2	=	Conductivity Current I, resistance	=	=
Week 22	2	=	Polarization of p and relation permittivity	=	=
Week 23	2	=	Fixed-voltage D and E	=	=
Week 24	2	=	Boundary conductivity	=	=
Week 25	2	=	Conductor , dielectrics, Capacitance	=	=
Week 26	2	=	Poissons" equation and Laplace	=	=

Week 27	2	=	The steady magnetic field	=	=
Week28	2	=	The steady magnetic field	=	=
Week 29	2	=	Magnetic Forces, Material and Inductance	=	=
Week 30	2	=	Magnetic Forces, Material and Inductance	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- Electromagnetic Fields /Sixth Edition by William Hayt. 2-Elements of electromagnetic by SADIKU
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 past year
Minimum number of students	No limits
Maximum number of students	No limits

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TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: MEASUREMENTS AND EQUIPMENTS

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	Laser and Optoelectronics Engineering
2. University Department/Centre	Laser & Optoelectronics Engineering / University of Technology
3. Course title/code	Measurements / LOPE2208
4. Programme(s) to which it contributes	General
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semester / Year
7. Number of hours tuition (total)	Two Hours / Week (Theory) 2H X30W=60H/Year
8. Date of production/revision of this specification	24/6/2017
9. Aims of the Course	
- See reference systems that describe units of measurement.	
- Knowledge of various types of electrical units.	
- Know the different types of errors in the measurement process.	
- Make statistical analysis of the errors in the measurement process.	
- Knowledge of the elements of electronic measuring devices.	
- How to choose and care using measuring devices.	

- See reference systems that describe units of measurement.
- Knowledge of various types of electrical units.

10· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Knowledge and Understanding
A1. Knowledge of the installation and operation of D'arsnoval measurable with moving coil.

A2. Enable the student to the optimal use of mathematical equations to design a device to measure a moving coil and how to use it for measuring electrical quantities (voltage - current - resistance).

A3. Enable the student to know the basic principles of bridges used in DC circuits in addition to the bridges used in AC circuits and their applications in measurement and control.

A4. Enable the student to know and understand the basic principles of the work of electronic measuring devices.

B. Subject-specific skills
B1. Use mathematical equations to work statistical analysis of the mistakes that you get during the measurement.

B2. Use mathematical equations to make the conceptual design of the devices to measure voltage and current.

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 the best solution through textbooks and lectures, in addition to the practical experiences laboratory.

Assessment methods

- Classroom discussions and to identify the potential of the student to analyze issues.
- Homework.
- Sudden exams.
- Quarterly examinations.
- Performance in the laboratory.

C. Thinking Skills
C1. Describe the elements of different measurement devices.

C2. Description and study of the factors causing the occurrence of errors during the measurement process.

C3. Description and study the types of bridges and its applications in DC and AC circuits.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1.

D2.

D 3 -

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-4	2Hrs/week	litruters	1. Introduction. 2. Classification of Measuring Instruments. 3. Essential Requirements of an Instrument. 4. Deflecting System. 5. Controlling System. 6. Damping System.	1.Tutorials 2. Power point literatures by Data show Reviews.	- Classroom discussions to identify the potential of the student to analyze issues. - Homework. - Sudden exams. - Quarterly examinations. - Performance in the laboratory.
5-8	2Hrs/week	=	1. Permanent Magnet Moving Coil Instruments (PMMC). 2. Moving Iron Instruments.	=	=
9-12	2Hrs/week	=	1. Basic D.C. Ammeter. 2. Multirange Ammeter. 3. The Aryton Shunt or Universal Shunt. 4. Requirements of a Shunt. 5. Basic D.C. Voltmeter.	=	=
17-21	2Hrs/week	=	1. Introduction to Resistance Measurements. 2. Classification of Resistances. 3. Voltmeter-Ammeter Method. 4. Ohmmeter Method. 5. Wheatstone Bridge Method. 6. Sensitivity of Wheatstone Bridge.	=	=
22-25	2Hrs/week	=	1. Introduction to A.C. Bridge. 2. Types of Bridges. 3. A.C. Bridges. 4. Maxwell's Bridge.	=	=
26-30	2Hrs/week	=	1. Hay's Bridge. 2. Wien's Bridge. 3. Heaviside Mutual Inductance Bridge. 4. Measurement of Power.	=	=

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Uday A.Bakshi. "Electrical Measurements", first edition 2008.

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 first year
Minimum number of students	No limit.
Maximum number of students	No limit.

COURSE SPECIFICATION: Freedom and Democracy 2ⁿᵈ year

The course covers the concept of human rights and development, definition , classes , properties , and the most important human rights conventions and declarations and international conventions on human rights , and human rights in religions and the role of non-governmental organizations in this field and other human rights issues.

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser and Optoelectronics Engineering department
3. Course title/code	Freedom and Democracy/LOPE 2109
4. Programme(s) to which it contributes	General
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st&2ndSemester / Year
7. Number of hours tuition (total)	Thirty Hours 1H X 30Week =30h/year
8. Date of production/revision of this specification	4/7/2017

9. Aims of the Course

The aims which can be achieved during teaching this course program are as follows:
1. Working to promote, disseminate and consolidate the culture of human rights , freedom and democracy among university students.
2. Promising d conscious generation and cultured human rights issues , freedom and democracy and believes in political pluralism and the peaceful transfer of medium- and freedom of expression and respect for and acceptance of the other opinion and respect for minority rights and peaceful coexistence in society .
3. Ability to diagnose human rights violations or restrict public freedoms or overtaking on the Constitution and the ability to propose realistic solutions to the problems of the community to achieve a peaceful coexistence in society .
4. Inform students on the experiences of past and contemporary Nations in the field of human rights , freedom and democracy of worldviews , humane and scientific , religious and objectively away from the effects of political, intellectual and religious .
5. Seeking to bring about a change in the student's behavior in line with the overall objective by directing attention to the implications of the real human rights and the dimensions of the legal and the study of international declarations and covenants , and the impact of the violations egregious to those rules , which affect the lives of people or their dignity , especially that human rights are inclusive and all human societies .

10· Learning Outcomes, Teaching ,Learning and Assessment Method

B- Knowledge and Understanding

A 1 - to identify the concepts of human rights , freedom and democracy

A 2 - to know and understand the most important terms that relate to the subject of human rights , freedom and democracy.

A 3 - to know and understand the principles and theories on human rights , freedom and democracy.

A 4 - to know and understand the most important announcements and international charters and conventions on human rights , freedom and democracy.

A 5 - to identify the key role of human rights issues , freedom and democracy in the stability of human societies.

A 6 - to know and understand the importance of employing the concepts of   human rights , freedom and democracy in public life , whether at home ,   school , university , work , street , factory .... etc. especially with the   worldview of modern issues of human rights , freedom and democracy .

B. Subject-specific skills

B 1 - the most important acquisition of the student terminology, principles and theories on human rights, freedom and democracy .

B-2 - the ability to debate and interpretation, analysis and comparison of the issues or the subjects on human rights, freedom and democracy, particularly in relation to the experiences of nations in this field .

B-3 Ability to summarize the issues and do rewrite the subject manner of its student .

B- 4 The ability to search and collection, arrangement and classification of   information when conducting research and writing scientific reports and do   activities and exercises and participation of various activities.

Teaching and Learning Methods

Method of lecture and discussion , preparation and effective participation of tribal, stirring diverse Questions for discussion, arrangement and discuss ideas, individual and collective debates between students, cooperative learning, how to do household duties Research - Abstracts - Posters, film screenings and educational presentations.

Assessment methods

Exam calendar, exam daily, monthly exam, attendance and active participation of students, providing research - summaries - Mural - Posters.

C. Thinking Skills

C 1 - Critical Thinking

C 2 - problem solving, brainstorming

C 3 - Case Study

C 4 - study skills

Teaching and Learning Methods

Way discussion, provoke questions and diverse ideas, research work and scientific reports, dialogue and debate between individual and collective student, individual and collective training to students, film screenings and educational presentations.

Assessment methods
Exam sudden, daily and monthly examinations, oral examinations variety of questions, participate effectively in the classroom, 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 - the ability to throw and apply for different subjects .

D 3 - to doing the work of different reports - summaries - Posters - 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	1	Lecture	concept of human rights and development of historic	Recognize the concept of human rights and development of historic	Exam and participation in the subject matter
2	1	Lecture	of the right to language and terminology and definition and characteristics of human right	Knowledge and understanding of the meaning of the right to language and terminology and definition and characteristics of human rights	Exam and participation in the subject matter
3	1	Lecture	type of human rights in the community	Knowledge and understanding of the importance of each type of human rights in the community	Exam and participation in the subject matter
4	1	Lecture	human rights in religions	Identify the implications of human rights in religions	Exam and participation in the subject matter
5	1	Lecture	human rights in religions	Identify the implications of human rights in religions	Exam and participation in the subject matter
6	1	Lecture	the regional human rights mechanisms and their application	Identify the terms of the agreements in the regional human rights mechanisms and their application	Exam and participation in the subject matter
7	1	Lecture	of human rights in international law and the extent to which	Identified on the basis of human rights in international law and the extent to which	Exam and participation in the subject matter
8	1	Lecture	human rights and public rights of persona	Comparison between human rights and public rights of persona	Exam and participation in the subject matter
9	1	Lecture	the stages of the international recognition of human rights	Identify the stages of the international recognition of human rights	Exam and participation in the subject matter
10	1	Lecture	non-governmental organizations and the defense of human rights	Identification of non-governmental organizations and the defense and diagnosis of human rights violations in the world and the mechanisms of action	Exam and participation in the subject matter
11	1	Lecture	non-governmental organizations and the defense of human rights	Identification of non-governmental organizations and the defense and diagnosis of human rights violations in the world and the mechanisms of action	Exam and participation in the subject matter
12	1	Lecture	content of the most important civil rights	Knowledge and understanding of the	Exam and participation in the subject matter

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
				content of the most important civil rights	
13	1	Lecture	content of the most important civil rights	Knowledge and understanding of the content of the most important civil rights	Exam and participation in the subject matter
14	1	Lecture	guarantees for the exercise of the rights and public freedoms in national legislation	Knowledge of the most important guarantees for the exercise of the rights and public freedoms in national legislation	Exam and participation in the subject matter
15	1	Lecture	the rights of the social strata, especially	Knowledge of the importance of the rights of the social strata, especially	Exam and participation in the subject matter

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	1	Lecture	the term public freedoms	Knowledge and understanding of the term public freedoms	Exam and participation in the subject matter
2	1	Lecture	the historical development of the rights and freedoms	Knowledge and understanding of the historical development of the rights and freedoms	Exam and participation in the subject matter
3	1	Lecture	public freedoms kinds	Know the meaning of public freedoms kinds	Exam and participation in the subject matter
4	1	Lecture	democracy	Identify the meaning of democracy	Exam and participation in the subject matter
5	1	Lecture	types of democracy	Knowledge of the most important types of democracy and the comparison between the kinds of	Exam and participation in the subject matter
6	1	Lecture	advantages and characteristics and conditions of democracy	Identify the advantages and characteristics and conditions of democracy	Exam and participation in the subject matter
7	1	Lecture	of individual freedom and liberty coercive	Know the meaning of individual freedom and liberty coercive	Exam and participation in the subject matter
8	1	Lecture	the state and the rights of sovereignty, freedom	Knowledge about the state and the rights of sovereignty, freedom	Exam and participation in the subject matter
9	1	Lecture	reconcile the sovereignty and freedom	Knowledge of how to reconcile sovereignty and freedom	Exam and participation in the subject matter
10	1	Lecture	the historical dimension of democracy	Recognize the historical dimension of democracy	Exam and participation in the subject matter

11	1	Lecture	pressure groups	Identify the influence of pressure groups in society	Exam and participation in the subject matter
12	1	Lecture	pressure groups	Identify the influence of pressure groups in society	Exam and participation in the subject matter
13	1	Lecture	components of democracy	Identify the most important components of democracy	Exam and participation in the subject matter
14	1	Lecture	components of democracy	Identify the most important components of democracy	Exam and participation in the subject matter
15	1	Lecture	the minorities and their participation in democratic governance	Know the meaning of the minorities and their participation in democratic governance	Exam and participation in the subject matter

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	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.

TEMPLATE FOR COURSE SPECIFICATION

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 and Optoelectronics Engineering Dept.
3. Course title/code	Engineering Analysis /LOPE3201
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	15/7/2017
9. Aims of the Course	
The aims which can be achieved during teaching this course program are : 1- Giving knowledge about using the advance mathematical theories in their studies.	
2- Provides the advanced mathematical methods which can be used in laser and optoelectronics theory and applications.	
3- Provide students with experiences that will assist them in solving the scientific problems.	

10· Learning Outcomes, Teaching ,Learning and Assessment Methode
A- Knowledge and Understanding A1. Enabling student to get the knowledge and understanding of the theoretical principles of mathematics. A2. Preceding the understanding to how solve the mathematical problems of the laser or optoelectronic concepts.
B. Subject-specific skills B1.Literatures B2. Tutorials B3. Conversation
Teaching and Learning Methods
1- Tutorials 2- Literatures.
Assessment methods
1- Examinations.
2- Quizzes.
3- Home works.
C. Thinking Skills C1. Ability of understanding mathematics concepts. C2. Certain discussion and conversation. C3. General information collection for different sources relating to the mathematical 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. Different group conversations.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Literature	Fourier Analysis Fourier Series	Lecture	Examinations, Quizzes.
2	=	=	Fourier Analysis Odd and Even Functions	=	=
3	=	=	Fourier Analysis Half-Wave Fourier series.	=	=
4	=	=	Fourier Analysis Frequency spectra Transformations.	=	=
5	=	=	Applications	=	=
6	=	=	Laplace Transformation Partial Fractions	=	=
7	=	=	Laplace Transformation Transformations	=	=
8	=	=	Laplace Transformation Solving Differential Equations	=	=
9	=	=	Laplace Transformation Solving Differential Equations	=	=
10	=	=	Applications	=	=
11	=	=	Complex Variables Complex Numbers	=	=
12	=	=	Complex Variables Cauchy-Remann Equations	=	=
13	=	=	Complex Variables Complex Functions	=	=
14	=	=	Complex Variables Integrations	=	=
15	=	=	Applications	=	=
16	=	=	Power series Divergence and Convergence	=	=
17	=	=	Power Series Solving Differential Equations	=	=
18	=	=	Power Series Solving Differential Equations.	=	=
19	=	=	Power series Basic Functions.	=	=
20	=	=	Power Series Legendr'e Polynomials	=	=
21	=	=	Power Series Bessel's Function.	=	=
22	=	=	Applications	=	=
23	=	=	Matrix Theory Basic Properties.	=	=

24	=	=	Matrix Theory Matrix Inverse.	=	=
25	=	=	Matrix Theory Solving Linear Equations.	=	=
26	=	=	Matrix Theory Solving Linear Equations.	=	=
27	=	=	Matrix Theory Eigen Values And Vectors.	=	=
28	=	=	Applications.	=	=
29	=	=	Numerical Analysis The Roots of Equation.	=	=
30	=	=	Numerical Analysis Integration	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Literatures in geometrical analysis for engineering.
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.
Minimum number of students	No limit.
Maximum number of students	No limit.

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 and Optoelectronics Eng. Dept.
3. Course title/code	Communications & Wave Propagation
4. Programme(s) to which it contributes	Laser & Optoelectronics
5. Modes of Attendance offered	Full-Time Attendance
6. Semester/Year	2014-2015
7. Number of hours tuition (total)	4 hours – 2 per each branch
8. Date of production/revision of this specification	20-06-2017
9. Aims of the Course	
To provide an introduction to, and understanding of, the fundamental principles of communication systems and radio wave propagation; to provide the theoretical analysis and analytical techniques to be used in future advanced modules.	

10. Learning Outcomes, Teaching ,Learning and Assessment Method

B- Knowledge and Understanding
- A1. Enable students to be familiar with different types of signals and systems.
- A2. To make students more understandable with the concepts of Linear Modulation techniques.
- A3. Enable the students to be familiar with the mathematical representation for each modulation type and systems response in both Time and Frequency Domain by using Fourier analysis.
- A4. Sampling, Quantization and digital transmission of analog signals; for instance Pulse Code Modulation.
- A5. Studying, analyzing and understanding the term of noise in engineering sight of view and how does it affect the overall performance of the system.
- A6. Maxwell's equations and different radio wave propagation.

B. Subject-specific skills
- B1. The benefit behind the modulation process and how to transform time-domain function to frequency domain using Fourier analysis.
- B2. Understanding the frequency translation and modulation theorem, in addition to Hilbert transfer function of some filter types.
- B3. How to calculate the overall system performance by the mean of SNR and Noise Figure.

Teaching and Learning Methods

1- Weekly lectures, lecture notes and text book all as references.
2- Power point presentations and monthly tutorials.
3- Simulink modules and simulation codes by using MATLAB.

Assessment methods

1- Direct and indirect question through lecture time.
2- Sudden Exams (Quiz).
3- Mid-year, second semester and final exam.

C. Thinking Skills
- C1. How to use Fourier analysis properties to think about how time and frequency shifting are valuable in modulation process.
- C2. Student's ability to re-derive the noisy received waveform and process it using either low pass or band pass filters.
- C3. The importance of convolution and correlation theorem in signal-systems interaction.
- C4. Looking to electromagnetic waves from the side of differential equation.

Teaching and Learning Methods

1- Weekly lectures, lecture notes
2- MatLab simulation tutorials and Solving questions.
3- Topics to be looked, analyzed and researched by students

Assessment methods

1- Evaluating marks depending on in-lecture student performance and their response to different types of given assignments.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1. Searching on International Network (Internet).
D2. Other resources could also be valuable; such as papers and other text books.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1st	2	Knowledge and Understanding	Introduction to Communication Systems	Weekly lectures, lecture notes and text book all as references	Mid-year, second semester and final exam
2nd-3rd	2	Knowledge and Understanding	Signals and Systems	Weekly lectures, lecture notes and text book all as references	Mid-year, second semester and final exam
4th – 15th	22	Knowledge, Understanding and Thinking	Continuous Wave Modulation, Digital Transmission of Analog signals and Digital Modulation	Weekly lectures, lecture notes, Power point presentations, monthly tutorials and Matlab	Mid-year, second semester and final exam, Sudden Exams, in-Lecture Questions
15th – 27th	24	Understanding and Thinking	Maxwell's Equations and Radio Wave Propagation	Weekly lectures, lecture notes	Mid-year, second semester and final exam, Sudden Exams, in-Lecture Questions
27th – 30th	6	Understanding and Thinking2	Transmission Lines and Waveguides	Weekly lectures, lecture notes	Mid-year, second semester and final exam, Sudden Exams, in-Lecture Questions

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- Communication Systems, Simon Haykin, 4th Edition. 2- Lecture Notes or any others.
Special requirements (include for example workshops, periodicals, IT software, websites)	1- Passing from 2nd year. 2- Very good understanding of different mathematical subjects.
Community-based facilities (include for example, guest Lectures , internship , field studies)	None

13. Admissions	
Pre-requisites	Passing from 2nd year
Minimum number of students	15
Maximum number of students	35

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	Computer applications
4. Programme(s) to which it contributes	Laser and Optoelectronics Engineering Programme
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semester / Year
7. Number of hours tuition (total)	Theoretical : 1hrs/w Practical : 2 hr/w 3H X30W=90H/Year
8. Date of production/revision of this specification	15 / 9 / 2016
9. Aims of the Course	
The aims which can be achieved during teaching this course program are as follows: 1-Ilustration and discussion the fundamental of MATLAB. 2- programming & drawing mathematical equations. 3- programming conditional statements. 4-programming loops. 5-Fourier and Laplace transformation.	

10· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding
A1.Enabling student to get the knowledge and understanding the fundamental
   of MATLAB programming for different equation.
A2. Enabling student to draw different equation by matlab programming.
A3. Enabling student to get the knowledge and understanding the Simulink blockes.

B. Subject-specific skills
B1.   Literatures
B2. Tutorials
B3. Laboratory and performing some programmes

Teaching and Learning Methods

1-Practical experiments.
2- Simulation and Innovation.
3- pdf literatures by Data show Reviews.

Assessment methods

1-Examinations.
2-Quizzes.
3- Home works.
4- Tutorials and discussions.

C. Thinking Skills
   C1. Reports.
   C2. Certain MATLAB problem analysis.
   C3. information collection for MATLAB functions.
   C4. Research and collection data.

Teaching and Learning Methods

1. Lectures.
2- Tutorials.
3. Experiments.

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)
   D1. Solution of different MATLAB programs.
   D2.Analaysis of programming & drawing mathematical equations
   D3. fourier and laplace transformation..

D4. Simulation modelling a simulink .

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	1+2	Practice	MATLAB Desk top	Lecture & Practice	Examinations and practice
2	=	=	MATLAB functions	=	=
3-5	=	=	Plotting	=	=
6-8	=	=	3D-plotting	=	=
8-11	=	=	Plotting multiple graphs	=	=
12-15	=	=	Conditional statement	=	=
16-18	=	=	loops	=	=
17-20	=	=	Integration & differentiations	=	=
21-23	=	=	Fourier & Laplace transformation	=	=
24-28	=	=	simulink	=	=
29-30	=	=	exam	=	=

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	

13. Admissions

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

COURSE SPECIFICATION

This course acquaints students of 3rd Year with the design, development, testing and documentation of physical optics . This couse include Franhofer and Fresnel difration , polarization ,polarization representation by using Jones facors, Fourier optics and Hologran..

1. Teaching Institution	University of technology
2. University Department/Centre	Laser & optoelectronics eng. Dept.
3. Course title/code	Phyiscal optics/OPE3304
4. Programme(s) to which it contributes	Optoelectronics program
5. Modes of Attendance offered	Complete Hours
6. Semester/Year	1st &2nd Semester / Year
7. Number of hours tuition (total)	Two Hours / Week (Theory) Two Hours / Week (Practical) 2H X30W=60H/Year +60H practical
8. Date of production/revision of this specification	7/7/2017

9. Aims of the Course

The aims which can be achieved during teaching this course program are as follows:

1- Giving knowledge about the physical optics

2- Understanding of programming in optics

10· Learning Outcomes, Teaching ,Learning and Assessment Method

A-Knowledge and Understanding

A1. .Enabling students to get the knowledge and understanding of the theoretical principles of physical optics .

A2. Understanding the difference between geometrical and physical optics phenomena

A3. Practical lab to increase the knowledge and the concepts of diffraction , polarization and holograms set up..

B. Subject-specific skills
    B1.Literatures
    B2. Tutorials
    B3. optics Laboratory.

Teaching and Learning Methods

1-phyiscal optics Laboratory.
    2- Power point literatures by Data show Reviews.

Assessment methods

1- Examinations.

2- Quizzes.

3- Home works.

4. Final Examination

C. Thinking Skills
    C1. Reports.
    C2. Home works .
    C3. Research

Teaching and Learning Methods

1- Literatures.
2- Applications in optics laboratory .

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	2+2	Literature and	Coherence	Lecture & p.p Show.	Examinations

		Experiments			,Quizzes, and Reports.
3-5	=	=	Matrix Treatment of Polarization	=	=
5-7	=	=	Production of Polarized Light	=	=
8-11	=	=	Fresnel Equations	=	=
12-16	=	=	Fraunhofer Diffraction	=	=
17-18	**=**	**=**	The Diffraction Grating	**=**	**=**
19-21			Fresnel Diffraction		
22-26			Fourier Optics		
27-28			Image quality analysis		
29-30			Holography		

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	- Computer Science, Dr. Balagurusamy E, 2005 -Visual Basic 6 , Made Easy, D.Liew Voon Kiong, 2006 -Visual Basic , Dr. Abdul Mutalib, 2004

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.

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 Eng department
3. Course title/code	Electronics (2)
4. Programme(s) to which it contributes	Laser & optoelectronics Programs
5. Modes of Attendance offered	Full time
6. Semester/Year	year
7. Number of hours tuition (total)	60 hours
8. Date of production/revision of this specification	26 / 10 / 2016
9. Aims of the Course	
Definition of the concepts advanced in electronics engineering students to the third stage of Opto-Electronics Engineering Branch	
Dealing with all kinds amplifiers and advanced electronic circuits	

Prepare students theoretically and practically in the field of competence of the planned public sector companies and private

10. Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Knowledge and Understanding
  A1. Knowledge of all kinds circuits amplification
  A2. Knowledge of all kinds of logical circuits
  A3. Special circuit oscillators knowledge and explain their applications
  A4. Feedback circuits definition

B. Subject-specific skills
B1.
B2.
 B3.

Teaching and Learning Methods

The development of the student's ability to apply the knowledge and the order to be able to correct analysis

Assessment methods

Classroom discussions and to identify the potential of the student to analyze issues

Homework

Sudden exams

Quarterly examinations

Performance in the laboratory

C. Thinking Skills
  C1. describe the process of building electronic circuits
  C2. Describe the types of feedback circuits
  C3. study logic circuits
  C4.

Teaching and Learning Methods

Employ all topics scheduled subject of 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	6 - hours per week (2 hours theoretical +4 hour practic (al	The - speakers + multi-stage amplifiers + Feedback	Electronic - amplifiers: principles and fundamentals	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	.Discussions - .Homework .Sudden exams Quarterly .examinations Projects and .seminars Laboratory
5-9	hours per week (2 hours theoretical +4 hour practical (	- Transistor amplifier power to all articles thereof + differential amplifiers + amplifiers process	High power - amplifiers	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	.Discussions - .Homework .Sudden exams .Quarterly examinations .Projects and seminars Laboratory
10-13	hours per week (2 hours theoretical +4 hour practical (	- Amplifiers of feedback circuits + circuits amplifiers process	Amplifiers with - feedback	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	.Discussions - .Homework .Sudden exams .Quarterly examinations .Projects and seminars Laboratory

14-17	hours per week (2 hours theoretical +4 hour practical (	- Continued voltages + collector voltages + comparative voltages + circuits Integration voltages using amplifiers process	Practical - applications of amplifiers	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	.Discussions - .Homework .Sudden exams .Quarterly examinations .Projects and seminars Laboratory
18-28	hours per week (2 hours theoretical +4 hour practical (	- Oscillator + oscillator phase difference (resistance and capacitor) + oscillator (file and inductors) + oscillator (square wave) + oscillator face trigono	Oscillators, filters -	Motivate the student to develop his abilities in data analysis question and diagnose the problem and describe the solution	.Discussions - .Homework .Sudden exams .Quarterly examinations .Projects and seminars Laboratory

		metric + all kinds of filters			

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	”sedra s.” electronic circuits ”theraja “ electronic circuits
Special requirements (include for example workshops, periodicals, IT software, websites)	Lectures are available on the - http://uotechnology.edu.iq/dep-laserandoptoelec-eng/branch/branch2.htm
Community-based facilities (include for example, guest Lectures , internship , field studies)	Conduct experiments in laboratories Hold seminars Summer Training

13. Admissions	
Pre-requisites	The success of the second year and good in English language
Minimum number of students	
Maximum number of students	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: **Infrared Technology for Third year**

COURSE SPECIFICATION

This Course Specification provides the main features of the **Infrared Technology** for the students of 3rd year. 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 programme specification as Optoelectronics Engineering.

1. Teaching Institution	University of Technology
2. University Department/Centre	Laser &optoelectronics Engineering Dept.
3. Course title/code	Infrared Technology / OPE 3306
4. Programme(s) to which it contributes	Optoelectronics Engineering Branch
5. Modes of Attendance offered	Actual classroom learning- interactive Full Hours
6. Semester/Year	1st &2nd Semester / 2014
7. Number of hours tuition (total)	2 Hours / Week Total =60H
8. Date of production/revision of this specification	8/05/2017
9. Aims of the Course	

The overall goals of the course are to develop student proficiency in:

I. Gaining factual knowledge (terminology, classifications, and methods) in the area of Infrared Technology

2. Learning fundamental principles, generalization or theories concerning the basic area of Infrared Technology

3. Learning to apply a background in physics and math and to improve engineering problem solving.

4. Developing skill in communicating engineering solutions both orally and in writing

10. Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Knowledge and Understanding

A1.Enabling student to get the knowledge and understanding of the theoretical principles of Infrared Technology.

A2. Understanding of Ideological philosophy of Infrared Technology and their applications.

A3. Understanding the knowledge of Infrared Technology for different methods of solution in their applications.

A4. At the end of the year the student should be able demonstrate knowledge and understanding of the concepts, theory and application of Infrared Technology

B. Subject-specific skills

B1.An ability to analyze the Infrared Technology problems.

B2. An ability to identify, formulates, and solves Infrared Technology problems.

B3. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Teaching and Learning Methods

- Include theoretical lectures and the Practical experiments.

- The implementation of reports by student and monitoring by supervisors

-Power point literatures by Data show Reviews

Assessment methods

-General or Central Examinations in scientific Dept.

-Quizzes.

-Home works.

-Tutorials and discussions

C. Thinking Skills

C1. Reports.

C2.Problem analysis depending on theoretical in formations.

C3. Decisions making for solve problems.

C4. Working together as groups.

Teaching and Learning Methods

-Literatures.

-Using the blackboard as basic way for learning.

-Using Al Data- Show for presentation of material.

Assessment methods

-First semester exam (15%).

-Second semester exam (15%).

-Home work and quizzes (10%).

-Final exam (60%).

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

D1. The ability to throw and apply for different subjects .

D 3 - To doing the work of different reports - summaries

D2. Examinations.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
Week 1	2	Literature and Experimental	Development of the IR Portion	Lecture	Examinations, Quizzes, and Reports Training.
Week 2	2	=	The market for IR system engineering	=	=
Week 3	2	=	The electromagnetic spectrum	=	=
Week 4	2	=	Measurement of radiation flux	=	=
Week 5	2	=	Thermal radiation Thermal radiation law	=	=
Week 6	2	=	Emissivity and krichohfe law Block body –type source	=	=
Week 7	2	=	Standards for source of radiant energy	=	=
Week 8	2	=	General purpose source of IR	=	=
Week 9	2	=	Targets and backgrounds	=	=
Week 10	2	=	Describing of optical system	=	=
Week 11	2	=	Typical optical system for IR (part 1)	=	=
Week 12	2	=	Typical optical system for IR (part 2)	=	=
Week 13	2	=	Methods of generating scan patterns	=	=
Week 14	2	=	Optical materials for IR	=	=
Week 15	2	=	Antireflection Coating	=	=
Week 16	2	=	High –Reflection Coating	=	=
Week 17	2	=	Optical Filters	=	=
Week 18	2	=	Collimators	=	=
Week19	2	=	Optical Filtering for Background Discrimination	=	=
Week 20	2	=	The use of Reticle for background Suppression	=	=
Week 21	2	=	Tracking system	=	=
Week 22	2	=	Fabrication of Reticle	=	=
Week 23	2	=	Thermal detectors Quantum detectors	=	=
Week 24	2	=	Imaging detectors	=	=
Week 25	2	=	Types of Noise Equivalent Noise Bandwidth	=	=
Week 26	2	=	Packaging cooled detectors Low temperature coolants	=	=
Week 27	2	=	The Generalized rang equation	=	=
Week28	2	=	Range equation for specific types of system	=	=
Week 29	2	=	Search system	=	=
Week 30	2	=	Tracking system	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- Infrared System Engineering by Hudson 2- Infrared Spectroscopy : Fundamental and Applications by Barbara Stuart
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 past year
Minimum number of students	No limits
Maximum number of students	No limits

.

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 detection engineering 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	Detection Engineering
4. Programme(s) to which it contributes	Optoelectronics engineering program
5. Modes of Attendance offered	Full time
6. Semester/Year	1st & 2nd semesters / year
7. Number of hours tuition (total)	2 hours/week (theoretical)+2 hours (practical)/ week 2H*30week=60hours/year(theory) 2H*30week=60hours/year(practical)
8. Date of production/revision of this specification	16/7/2017
9. Aims of the Course	
1. Give sense for detector types and classifications	
2. Give theory of quantum detectors operation	
3. Give theory of thermal detectors operation	
4. The effect of noise on detectors operation	

5. The operation concept of some quantum and thermal cameras
6. Studying the main circuits of some famous visible and Infrared detectors
7. Studying the Photo emissive Imagers and sensors.
8. Studying the design and concepts of signal conditioning

10· Learning Outcomes, Teaching ,Learning and Assessment Methods
A- Knowledge and Understanding A1.Enabling student to get the knowledge and understanding the fundamental of optical detection theory for different types. A2. Enabling student to understand the way by which can use the specified detector. A3. Enabling student to get knowledge and understanding of circuits that can be used to achieve the detection process.
B. Subject-specific skills B1 The graduates have sense to general types of optical detectors and their applications. B2.The graduates have an ability to design different types of optical detector circuits. B3.The graduates can solve engineering problems related with optical detectors and sensors. B4. The students sense about the application of sensors in optical communications.
Teaching and Learning Methods
1-Practical experiments. 2- Simulation and Innovation. 3- pdf literatures by Data show Reviews.
Assessment methods
1-Examinations. 2-Quizzes. 3- Home works. 4- Tutorials and discussions.
C. Thinking Skills C1. Through full year the student can recognize the relation between theoretical and practical study.. C2. The students can design and finding solutions for different problems concerning optical detectors.. C3. They can follow the signals in engineering circuits and make signal conditioning to interface with computer.. C4. They will be able to improve their capabilities to work with different materials and energy sources to design and operate different types of optical detectors and to achieve the required analysis..
Teaching and Learning Methods
1-Literatures. 2- Tutorials. 3. Experiments.
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)
  D1. Studying of different types of optical detectors and comparing.
  D2.The graduates will be able to communicate for long-life learning in different fields of
  engineering and science.
  D3. Solution of different circuits through signal conditioning.
  D4. Encouraging the students to train on some software package programs.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2+2	Literature , Experimental,	Electromagnetic Waves	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
2	2+2	Literature , Experimental,	Classification of detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
3	2+2	Literature , Experimental,	Optical detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
4	2+2	Literature , Experimental,	Photoemssive photodetectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
5	2+2	Literature , Experimental,	Photoconductive detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
6	2+2	Literature , Experimental,	Photovoltaic detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
7	2+2	Literature , Experimental,	Detector construction	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
8	2+2	Literature , Experimental,	photomultipliers	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
9	2+2	Literature , Experimental,	General conductivity	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.

10	2+2	Literature , Experimental,	Optical (quantum and thermal) effects	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
11	2+2	Literature , Experimental,	Figures of Merit	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
12	2+2	Literature , Experimental,	Noise Contamination	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
13	2+2	Literature , Experimental,	Noise generators and their equivalent circuits	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
14-15	2+2	Literature , Experimental,	Types of noise	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
16 -17	2+2	Literature , Experimental,	Visible light and Infrared detector circuits	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
18	2+2	Literature , Experimental,	Basic principles of thermal detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
19-20	2+2	Literature , Experimental,	Bolometer and thermistor detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
21	2+2	Literature , Experimental,	Thermopile detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
22-23	2	Literature , Experimental,	Pyroelectric detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
24-25	2	Literature , Experimental,	Operational Amplifiers for detectors	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
26	2	Literature , Experimental,	Basic Operational Amplifier Configurations	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
27	2	Literature , Experimental,	Thermocouple detector signal conditioning	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
28	2	Literature , Experimental,	RTD detector signal conditioning	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
29	2	Literature , Experimental,	Semiconductor image sensor	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.
30	2	Literature , Experimental,	revision	Lectures using whiteboard and data Show.	Examinations ,Quizzes, and Reports.

13. Admissions	
Pre-requisites	Pass from the second stage

Minimum number of students	No limit
Maximum number of students	No limit

TEMPLATE FOR COURSE SPECIFICATION

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 physics & material science/ OPE 3302.
4. Programme(s) to which it contributes	Optoelectronic Engineering
5. Modes of Attendance offered	Full Time
6. Semester/Year	1st & 2nd semesters/ year
7. Number of hours tuition (total)	2hours /week 2H*30=60hours/year
8. Date of production/revision of this specification	18-6-2017

9. Aims of the Course

- Introduction to material science engineering for students of the third year/optoelectronic engineering branch, like crystal structure, classification of material,etc .

- Use of x-ray diffraction for determination of crystal structure of material and the classification of the material.

- Study of Diffusion mechanism in material like Steady-state and non-steady state diffusion and the effect of the important parameters that affect on

diffusion.

- Study the phase-diagram and phase transformation to determine the microstructure of the material.
- Study the different properties of material such as mechanical, electrical,optical and thermal.

A- Knowledge and Understanding

A1. Know the classification of material and study its structure and properties.

A2. Enable the student to know and understand the crystal structure of different material and how to examine the structure by using the x-ray diffraction.

A3. Enable the student to study and understand the diffusion mechanism.

A4. Enable the student to study and understand the type of imperfections in solid and the phase diagram of the material.

A5. Enable the student to learn and understand the mechanism of electrical, optical and thermal properties of material.

B. Subject-specific skills

B1. Find the Atomic Packing Factor (APF) of different cubic crystal system (BCC,FCC,Simple cubic).

B2. Calculation of Miller indicies, Lattice parameter and d-spacing of crystalline material by x-ray different Technique.

B3. Explain the type of imperfections and calculation the activation energy for different crystal system.

B4. Calculate the effect of different parameters on diffusion mechanism such as temperature, time, and concentration.

B5. Determination of phase- diagram for different material.

B6. Calculation the mechanical, electrical, optical and thermal properties of material.

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 physics & material science).

-Classroom discussions and to identify the potential of the student to analyze problems.
  -Homework.
  -Suddenexams.

-Quarterly examinations.
-Projects and seminars.

C. Thinking Skills
C1. Description of crystal structure.
C2. Description of diffusion mechanism.
C3. Description of phase diagram.
C4. Understanding the theory of imperfection in solid.
C5. Describe the theory of material 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	Periodic array of atoms Fundamental types of crystal system lattice parameter. Simple crystal structure miller indices Crystal system Direction Position Planes	**Crystal Structure**	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.
4-6	3 hours per week	Single crystal and polycrystalline material Amorphous material Determination of crystal structure X-ray diffraction and Braggs Law Determination of crystal structure Non-Crystalline solid	**Crystalline and non crystalline material**	=	=
7-9	3 hours per week	Point Defects Dislocation Vacancies Impurities in solid Line Defect Bulk or volume Defect Concept of Microscopy Microscopy Technique Grain size determination	**Imperfection in solids**	=	=
10-13	4 hours per week	Theory of Diffusion Steady State Diffusion Non Steady State diffusion Activation energy for diffusion Factors that influence diffusion	**Diffusion in Solids**	=	=
14-17	4 hours per week	Introduction Concept of stress and strain Stress Strain behavior	**Mechanical properties of Material**	=	=

		Elastic Properties of Material Plastic deformation Tensile properties True stress-strain Elastic recovery after plastic deformation Shear Stress Hardness variable of material properties			
18-20	3 hours per week	Definition and basic concepts single and multiphase solids Solid Solution Phase rule binary phase diagram Construction of phase diagram Lever ruler Eutectic system Eutectoid system Phase Transition Basic concept Kinetics of Phase transition Material versus Equilibrium state	**Phase Diagram**	=	=
21-23	3 hours per week	Single crystal growth Polycrystalline Growth from melts Non-Melts techniques	**Crystal growth**	=	=
24-26	3 hours per week	Metals and Alloys Semiconductor Glass,Ceramic,glass-ceramic Composite material Polymers section of material Basic properties	**Classes of engineering material**	=	=
27-30	4 hours per week	Electrical Properties Optical Properties Thermal Properties	**Material Properties**	=	=

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	-Material Science and Engineering An introduction 8th Edition William D.Callister David G.Rethwisch John Wiley& sons 2010 -Introduction to Solid State Physics Sven Edition Charles Kittel John Wiley& sons 1996
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 2nd year exam. University physics (LOPE 1202) Pass Mathematics (LOPE 1201) 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

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	19/05/2017
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)	Knowledge and Understanding, subject	Link Budget	=	=

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

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	19/07/2017

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

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	19/07/2017
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

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	22/07/2017
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, discussion, 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	19/05/2017
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

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	24-06-2017
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

				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.
1-3	3 hours per week	Atomic bonding Bohr Model. Atomic Structure The hydrogen atom	**Atoms and Electrons**		
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 Solids Density state functions Mathematical derivation	**Quantum Theory of solid**	=	=

		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 3rd 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	7/7/2017

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.