Appendix B

MODULE HANDBOOK

Module Name	Course Name
Language Teaching	College English (1-4)
	Technical English Reading
	Intermediate Interpretation of Technical English
General Course	Ideological, Moral Cultivation and Basic Law
	Outline of Chinese Modern and Contemporary History
	An Introduction to Basic Principle of Marxism
	MAO Zedong Thought and Chinese Characteristic Socialism Theory System Introduction
	Social Practice
	Military Knowledge
	Military Training
	Physical Education (1-4)
	Industrial Management and Economics
	Production Plan and Control
Basic Mathematics A	Linear Algebra
	Calculus (1-2)
Basic Mathematics B	Stochastic (Prob. and Statistics)
	Compl.Funct.Integr.Tr.
Physics	College Physics A (1-2)
	College Physics Experiment (1-2)
Computer Science	Information Technology
	Information Technology Experiment
	Program Design and Practice (C)
	Program Design and Practice (C)Experiment
	Advanced Program Development and Application B
	Advanced Program Experiment
	Engineering Drawing Foundation (1-2)
Microcontroller	Microcontroller and its Application (1-2)
	Microcontroller I Experiment (1-2)
	FPGA and its Application
	Microcontroller II Design
Technical Optics	Optical Engineering (1-2)
	Lab Applied Optics (1-2)
	Optical System Simulation with Software
Electronics	Analog Electronic Tech.
	Digital Electronic Tech.
	Lab Analog Electronic Tech.
	Lab Digital Electronic Tech.
Electric Circuits	Electrotechnics Foundation
	Circuit Principles (1-2)

	Lab Circuit Principles (1-2)		
Optoelectronics	Optoelectronic Principles		
	Optoelectron. Devices		
	Lab Optoelectronics		
Laser Technology	Laser Technology		
	Laser Lab.		
Optical Commun.	Fiber Optics and Opt. Comm.		
	Lab. Opt. Comm.		
Modern optics	Optical Information Processing		
	Computer aided Optical Design		
	Lab. Optical design		
	Academic Seminar		
Measurem. and Sensor	Signals and Systems		
	Nanometrology		
	Weak Signal Detection		
Specialities Optoelectr. (Elective Course)	Course Name	CP	H.
	Image Processing	2	32
	Photovoltaic Tech.	2	32
	Measurement and Control Circuits	2	32
	Infrared Technology	2	32
	Thin Film Technology	2	32
	Modern Illumination Technology	2	32
	Optical Information Network	2	32
	Integrated Circuit Manufacturing Tech	2	32
	The Photoelectron Emitting and Display	2	32
	Biological Optical Measurement	2	32
Enterprise Practice	Metalworking Practice		
	Internship		
	Seminar on Internship		
	Lab. +Workshop Train.		
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Biological Optical Measurement 195

Module designation	Basic Mathematics A
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	1or2or3
Person responsible for the module	Associate Prof. Dr. CAO Weili
Lecturer	Prof. JIA Gao Associate Prof.WEI Gongming Assistant Prof.YU Zhixian Lecture LIU Ling Lecture HU Jianhua
Language	Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture/14hours per week of the module
Workload	Tuition time: 10 hours per week Self-study: 13 hours per week
Credit points	14
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of elementary Mathematics and elementary physics
Module objectives/intended learning outcomes	● **Course goals** Calculus is a deductive science and a branch of pure mathematics. At the same time, it is very important to remember that calculus has strong roots in physical problem and it derives a strong theoretical development with sound training in technique. This course aims to introduce a fundamental knowledge of calculus, providing students with an in-depth applied mathematics training in their capability of both analyzing and solving problems in the field. This course will also provide the foundation for students' studies in other following course. With emphasis on functions of several variables, mainly including partial derivatives and multiple integrals. On one hand, students should understand the theory and methods of derivative and integral for functions of several variables. On the other hand, they should skillfully compute partial derivatives and multiple integrals. The intended learning outcome is that the students gain the ability to apply the theory to

	and skills to practice, e.g. problems in geometry and physics. ● **Learning objectives** On successful learning of this course students will master the basic theory and method of linear algebra, and improve the abilities to solve the practical problems. The student should be able to demonstrate the following learning outcomes: 1. Familiar with matrix, determinant, system of linear equations, vector spaces, eigenvalues and eigenvectors, quadric forms; 2. Gaining practical abilities for dealing linear problems; 3. Through learning, students are able to -understand the definition and properties of determinant; calculate the determinant; - master the operations between matrices; be familiar with some special matrix, such as diagonal matrix, symmetrical matrix, antisymmetric matrix, invertible matrix, orthogonal matrix, positively definite matrix; master line and column elementary transformation; -understand the linear dependence and linear independence of vectors ; -give the solutions of system of linear equations; -computing eigenvalues and eigenvectors of square matrixces;master the method diagonalization of matrix; -give the normal orthogonal basis in n-dimension linear space; -familiar with quadric forms and their representations by matrix; transform the quadratic forms to their standard forms; -understand linear transformations,especially linear invertible transformation, orthogonal transformation.
Content	● **Linear Algebra:** 1. Determinant 2. Matrix 3. System of linear equations 4. Vector spaces 5. Eeigenvalues and eigenvectors 6. Quadric forms ● **Calculus 1:** The content of this course will be taught in seven chapters, mainly includes Function and limit, Derivatives

	and Differentials, Mean value theorem and its applications, Indefinite integral, Definite integral, Application of definite integral, Introduction to differential equations. The following will be the detail. **Chapter 1**. **Functions and Limits** Understand the definition of a function; Establish a simple practical model with functional relationship; Understand the definition of a limit and master Rules for working with limits; Use properties of infinitesimal to calculate the limit; Understand the concept of the continuity function; Grasp clearly rules and properties of continuous functions on closed interval. **Chapter 2**. **Derivatives and Differentials** Deeply understand definition of derivative at a point and derivative functions; Understand geometric significance of derivatives ; Skillfully grasp rules for derivatives, higher-order derivatives, and derivatives of functions defined by parametric functions and implicit functions; Understand the concept of differential for a function. **Chapter 3**. **Mean value theorem and its applications** Grasp Rolle's theorem, Lagrange's mean value theorem and Cauchy's mean value theorem; Be familiar with applications of L'Hospital's rule; Clear the monotonicity and concavity of curves and Points of inflection; Sketch the graph of functions; Be able to find extremum, maximum and minimum, and their applications. **Chapter 4**. **Indefinite integrals** Understand the concept of indefinite integral and its properties; Skillfully grasp integration by substitution and some basic integral formula; Skillfully master integration by parts; Be able to calculate integrations of Trigonometric functions and Rational functions. **Chapter 5**. **Definite integrals** Understand the definition of definite integral, its properties and the fundamental theorem, some geometric explanatory remarks;

	Be familiar with the Newtonian - Leibniz formula; Skillfully Master integration by substitution and integration by parts; Calculate two kinds of improper integral. **Chapter 6. Geomeric and Physical Application of definite integral.** Apply the definite integrals to calculate Areas of more complicated plane regions, Volume, the arc length of curves and Area in terms of polar coordinates; Be able to calculate Work, Pressure and Gravity by using definite integral. **Chapter 7 Introduction to differential equations** Understand the basic concept of differential equations; Be able to find complete solutions and the particular solution for some special differential equations; Be able to formulate and solve differential equations according to some geometrical and various physical problems. ● **Calculus 2** **Space analytic geometry and vector algebra** Definition of vector; Scalar and vector product; Surface and its equation; Line and its equation; Plane and its equation. **Derivatives of functions of several variables and applications** Definition of function of several variables; Partial derivatives; The differentials of functions; The chain rule for compound functions; Partial derivative of implicit functions; Directional derivatives and gradients; Maximum and minimum: the method of Lagrange multiplier. **Multiple integrals** Double integrals. Definition and properties; Computation: right angled and polar coordinates. Triple integrals. Definition and properties; Computation: right angled, cylindrical and spherical surface coordinates. Applications: geometry and physics. **Curve integrals and surface integrals** Curve integral for arc length; Curve integral for coordinates; Green's formula and applications; Surface integral for area; Surface integral for coordinate; Gauss's formula: applications to geometry and physics.

Study and examination requirements and forms of examination	● **Linear Algebra:** written examination; ● **Calculus 1:** The examination is divided into two parts: The mid-term examination and The final-term examination; ● **Calculus 2:**written examination.
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● Cao Weili etc. ,Linear Algebras, Hunan Science and Technology Press,2010.1 ● Learning guidance of Linear Algebras , University of Shanghai for Science and Technology, Hunan Science and Technology Press,2010.1 ● Linear Algebras, Tongji University, High Education Press, 2000.1 ● Higher mathematics2, Department of mathematics, Tongji University, Higher Education Press, 2007 (Sixth Edition) ● Guidance to higher mathematics, laboratory of higher mathematics, University of Shanghai for Science and Technology, 2005 ● Higher mathematics, Tongji University, Department of mathematics, Higher Education Press, 2007.4 (Sixth Edition)

Module designation	Basic Mathematics B
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	4or5
Person responsible for the module	Prof.LIU Xiping
Lecturer	Associate Prof. CAO Weili Associate Prof.FAN Hongfu Associate Prof. HE Changxiang Lecturer Wu Baofeng Lecturer ZHANG Haiqiang
Language	Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar/5hours per week of the module
Workload	Tuition time: 3 hours per week Self-study: 4 hours per week
Credit points	5
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of Calculus and advanced mathematics
Module objectives/intended learning outcomes	● **Course goals** 1. Complex Variable. This part includes fundamental knowledge which extends the concepts of the course of Calculus to complex field, such as elementary function, limit, continuation, integral, series, etc. 2. Integral Transformation. This part is an important application of mathematics for Engineering Students. Being Good at it will lay a solid foundation for the succeeded courses such as Differential Equation, Methods of Mathematical Physic, etc, and also for other major courses such as Electro technology, Analog electronic circuit, Principle of Automatic Control, Signal Processing, etc. ● **Learning objectives** 1. Familiarity with the basic concepts about analytic function, complex integral, residue, Fourier transformation, Laplace transformation, etc. 2. Understanding the basic theory and complex

	arithmetic, and other mathematics knowledge and skills. 3. Master basic concepts about Probability Theory and Mathematical Statistics; understand the basic theory and method; realize the processing of the phenomenon of random basic idea and method; develop the ability to solve practical problems using the method of probability and statistics analysis.
Content	● **Stochastic(Prob. and Statistics):** Random Events and Probability Random Variables and Distribution Expectation and Variance Multi-dimensional Random Variables and Distribution Law of Large Numbers and Central Limit Theorem Basic conceptions of Statistics Estimation Problems Testing Hypothesis ● **Compl. Funct. Integr. Tr.:** 1. Complex Variable. This part includes complex number and complex Variable function, analytic function, complex integral, Taylor series, Laurent series, residue. 2. Integral Transformation. This part includes Fourier transformation, Laplace transformation.
Study and examination requirements and forms of examination	● **Stochastic(Prob. and Statistics):**30% for homework and attendance, 70% for final written examination ● **Compl. Funct. Integr. Tr.:** Written examination
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● Complex Variable, Xi'an Jiao Tong University, Higher Education Press, 1996.5(Fourth Edition) ● Zhang Yuanlin, Integral Transformation, Higher Education Press, 2003.12(Fourth Edition) ● Ye Cinan and Liu Xiping, Probability Theory and Mathematical Statistics, Science Press, 2010 ● The study guide to probability theory and mathematical statistics, Office of Engineering Mathematics, USST ● Sheng Zhou, Xian Shiqian and Pan Chengyi, probability theory and mathematical statistics, Zhejiang University Press, 2008 ● He Shuyuan, probability theory and mathematical statistics, Higher Education Press, 2006

Module designation	Physics
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	1or2
Person responsible for the module	Prof. Dr. GU Zhengtian
Lecturer	MA Haihong ZHOU Qun TANG Meng CAI Xiongxiang GUO Li MA Shanshan Senior Lecturer. CHEN Jun
Language	English /Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar / discussion, Doing experiments independently/10hours per week of the module
Workload	Tuition time: 7 hours per week Self-study: 9 hours per week
Credit points	10
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of Calculus, Vector analysis, college physics
Module objectives/intended learning outcomes	● **Course goals** With an emphasis on an College Physics module, students will familiar with basic ideas of physics methods, students will gain an Professional and improved ability to analyze and solve physical problems; Enable the students to learn the basic knowledge of physical experiments, methods and skills. Training and Improving students' experiment ability and accomplishment. To deepen understanding of the principles of physics. ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes:

	1. Establish dialectical materialist world view and scientific attitude to seek truth. 2. Acquire the ability of abstract thinking. 3. Improve self-study ability. 4. Acquire the ability to analyze and solve problems. 5. Capable of computing and judging. Use the mathematical tools to solve general problems in physics, calculation and estimation are included. 6. Be able to read the textbook, reference materials, equipment specifications for experimental preparation. 7. Apply theory to undertake preliminary analysis to judge the experimental phenomena. 8. Record and deal with the data of experiments correctly; Be able to write a qualified experiment report. 9. Students are required to grasp the concept of significant digits error and correct processing of the experimental data.
Content	● **College Physics A(1) :** **Part One Mechanics** Ch1 Kinematics Ch2 Newton's Laws of Motion Ch3 Momentum and Angular Momentum Ch4 Work and Energy Ch5 Rotation of a rigid body Ch6 Fundamentals of Special Relativity **Part Two Thermodynamics** Ch7 The Kinetic Theory of Gases Ch8 Fundamentals of Thermodynamics **Part Three Electromagnetic theory** Ch9 Electrostatic Field in Vacuum Ch10 Conductors and Dielectrics in Electrostatic Field ● **College Physics A(2):** **Part Three Electromagnetic theory** Ch11 Magnetic Field of a Steady Current in Vacuum a)Steady Current b)Magnetic Field in Vacuum c)Magnetic Field in the Medium Ch12 Electromagnetic Induction and Electromagnetic Field **Part Four Oscillation and Waves** Ch13 Oscillation

	Ch14 Waves **Part Five Optics** Ch15 Geometrical Optics Ch16 Interference of Light Ch17 Diffraction of Light Ch18 Polarization of Light **Part Six Fundamentals of Modern Physics** Ch19 Brief Introduction of Quantum Mechanics Ch20 Brief Introduction of Solid Physics Nuclear Physics and Astrophysics ● **College Physics Experiment (1):** 1. Introduction 2. Length measurement 3. Optical lever measuring metal linear expansion Coefficient 4. Adjustment of Michelson interferometer and use 5. Principle and application of oscillograph 6. Spectrometer adjustment and use 7. The torsion pendulum method for measuring moment of inertia 8. Measurement of low resistance 9. Photoelectric tube volt-ampere characteristic curve Measurement ● **College Physics Experiment (2):** 1. Ballistic galvanometer to measure capacitance 2. Franck Hertz experiment 3. Hall effect 4. The measurement of the velocity of sound 5. Grating spectrometer to measure the H atom RH 6. Metal electric work function measurement 7. Millikan Oil Drop Experiment 8. The Planck constant by photoelectric effect
Study and examination requirements and forms of examination	● **College Physics A(1) :** written examination; ● **College Physics A(2):** written examination; ● **College Physics Experiment (1):** Students should write 9 experiment reports. ● **College Physics Experiment (2):** Students should write experiment reports and Independently complete one design experiment.
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, General Physics Network center of University of Shanghai for Science and Technology
Reading list	● Cheng Shouzhu, Jiang Zhiyong, General Physics, Higher Education Press , 2006.12(Sixth Edition)

	● Zhang Sanhui, College Physics, Tsinghua University Press, 1999.4(Second Edition) ● Ma Wenwei, Physics, Higher Education Press , 2006.1(Fifth Edition) ● Gu Zhengtian, Chen Jun, College Physics Synchronous Tutorship Review and Self-testing, China Machine Press,2009 ● Francis W.Sears, Mark W.Zemansky, College Physics, Addison-Wesley Publishing Company, 1991 ● Forest Xin, Modern physics experiment course, Science Press, 1999.7 ● Yang Shuwu, General physics experiment, Higher Education Press, 2000.5 ● Liu Yaru, University Physics Experiment, Metallurgical Industry Press, 2000.4 ● Zhao Jiafeng, University Physics Experiment, Science Press, 1999.1 ● Wang Huidi, Physics experiment, Tianjin University press, 1989.9 ● Yang Shuwu, Chen Guoying, Yang Jiexin, General physics experiment, Higher Education Press, 2000 ● He Pingsheng, Polymer physics experiment, University of Science &amp, Technology China Publishing, 2002 ● Zhang Xiong, Physics experiment design and research, Science Press, 2001 ● Wan Chunhua, University Physics Experiment, Nanjing University Press, 1999 ● Gold heavy, University Physics Experiment Course, Nankai University Press, 2000 ● Huang Jiangang, University Physics Experiment, Hunan University Press, 2003 ● Liu Shaojie, University fundamental physics experiment, Nankai University Press, 2002 ● Li Jinglin, Modern physics experiment, Northern Jiaotong University Press, 2003

Module designation	Computer Science
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	1or2or5
Person responsible for the module	Associate Prof. Dr. ZHANG Xuedian
Lecturer	Associate Prof. ZANG JingSong Lecturer LI Zhenqing Lecture LIU Lixia Lecturer HUANG Xiaoyu
Language	English /Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar / discussion, professional software practice based tuition for advanced optical system design/19hours per week of the module
Workload	Tuition time: 14 hours per week Self-study: 17 hours per week
Credit points	19
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of computer, computer programming language and Some previous programming experience
Module objectives/intended learning outcomes	● **Course goals** With an emphasis on a computer science module, students will gain an Professional and improved knowledge of computer programming, software design and system development; The aim of the module is to make the students own the basic characteristic and skills to work as a primary optical and electrical engineer after learning the advanced optics module. ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes: 1. Understand the components of a computer system its functions. 2. Understand the software development and the problem solving. 3. Understand how this foundation can lead to more

	advanced courses in computer science. 4. Be able to design and implement programs in Scheme that demonstrate the concepts covered in the course. 5. Be able to read and modify a substantial program, if it is written in exemplary style. 6. Be able to develop a program and debug a program; Identify and correct errors and add or remove from existing code. 7. Gain experience working with a large program, modifying existing code of a large program and expanding existing code.
Content	● **Information Technology and Information Technology Experiment:** Introduction; Windows and the Graphical User Interface Managing Files; Computer Hardware; Computer Software; Computer Networks: Internet and Email, Network and internet Security and Privacy; MS Word: Creating a document, Formatting a long document, Enhancing a document; Excel: Creating a workbook, Formatting a workbook, Working with formulas and functions, Inserting and Formatting Charts; ACCESS: Creating a Database, Maintaining and Query a Database, Creating Forms and Reports; PowerPoint; ● **Program Design and Practice (C)：** General Introduction: Fundamentals of C, Identify the features of C; Data structures and storage, control structures, execution environments, input/output, syntax and semantics of C languages; Identify the parts of a C program. Match the C preprocessor directives with their uses. Sequence the steps in the creation of an executable file from a C source code file. Match the data types with their functions; Operators and Flow Control Statements, Identify valid C expressions. Calculate the output of an expression that uses arithmetic operators. Calculate the output of an

	expression that uses relational operators; Functions in C, Sequence the code of a function definition to generate a required output. Identify the result of a program by analyzing the scope of a variable within a program; Practical and theoretical topics including structured programming, specification and documentation of programs, debugging and testing strategies; ● **Program Design and Practice (C) Experiment：** Phases of software development: requirements, analysis, testing, design; OO programming: Class define, Operator overloading, Inheritance and Polymorphism; Database management: Record and attitude of data, How to link with database with c/C++; A case of simple data management system; ● **Advanced Program Development and Application B and Advanced Program Experiment:** A comprehensive understanding of the theory and applications of microcontrollers is a fundamental requirement for students in the area of information and electrical engineering. This course, which has a practical emphasis, encompasses the internal structure, function and interfacing techniques of microcontrollers, thereby enabling students to apply theoretical ideas to real-life situations. As well as providing a solid engineering foundation, the course also cultivates expertise in design, innovation and multifaceted applications. Additionally, it forms the basis for later academic courses, and assists students in preparing for their professional careers. ● **Engineering Drafting Foundation (1-2)：** The course introduces the preparation, representation and reading of engineering drawings. Engineering drawing similar to characters and numbers, is one of the indispensable tools used by human for technical communication and is an important technical document in industry for design, manufacture, operation, and maintenance, so it is called as “a common technical language for engineers”. This course teaches students the related national standards in Mechanical Drawing and Technical Drawing as well as the basic engineering knowledge, basic theories of drawing preparation, regulations, up-to-date drawing technologies, etc. This

	course is with emphases on precise understanding and apprehension of the basic theories, procedures and skills of drawing, for students to communicate effectively with their working partners in the future.
Study and examination requirements and forms of examination	● **Information Technology :** written examination; ● **Information Technology Experiment:** written examination ● **Program Design and Practice (C) :** programming examination; ● **Program Design and Practice (C) Experiment :** programming examination; ● **Advanced Program Development and Application B :** written examination combined with the individual design work submission ● **Advanced Program Experiment:** written examination ● **Engineering Drafting Foundation (1-2)** : submit individual design work combined with the oral examination;
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● Dennis M. Ritchie and Brian W. Kernighan, The C Programming Language, 2007 (second edition) ● Hu Lin, Engineering drawing, Mechanical industrial Press, 2006 ● Gary J.Bronson, A First Book of ANSI C,(Fourth Edition) ● Al Kelley and Ira Pohl , A Book on C : Programming in C, 2004(Fourth Edition) ● Stewart Venit, Elizabeth Drak, Concise Prelude to Programming: Concepts and Design(Third Edition) ● Jesse Liberty, David B.Horvath, Teach Yourself C++ in 24 hours, CCP ● E Balagurusamy , Object Oriented Programming with C++(Fourth Edition) ● Walter Savitch, Problem Solving with C++ (Sixth Edition) ● J. Glenn Brookshear , Computer Science: An Overview, Marquette University(Seventh Edition)

Module designation	Microcontroller
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	4or5or6
Person responsible for the module	Associate Prof. JIAN XianZhong
Lecturer	Associate Prof. ZHANG HuiLin Associate Prof. XIAO ErLiang Associate Prof. SUI Guorong Lecture HU Qi Lecture FANG Baoying
Language	English /Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar / discussion, professional software practice based tuition for CPU system design/15hours per week of the module(cpu and FPGA)
Workload	Tuition time: 11 hours per week Self-study: 14 hours per week
Credit points	15
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, electronic and the Computer Science Module
Module objectives/intended learning outcomes	● **Course goals** With an emphasis on Microcontroller module, students will gain an Professional and improved knowledge of Microcontroller & its Application and FPGA & its application ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes: 1. Mastering the working principle of the single-chip microcomputers, the instruction sets 2. Mastering the working principle of FPGA 3. Understanding assembly language programming skills, interface technology and practical applications 4. Understanding to design a simple microcontroller applications

	5. Mastering FPGA design from RTL design, functional simulation and synthesis 6. Mastering to accomplish complex logic design independently 7. Understanding to use FPGA designing embedded system
Content	● **Microcontroller and its Application(1-2):** General Introduction; Introduction the structure and working principle of the microcontroller; Introduction microcontroller addressing modes, instruction sets and its application design; Introduction Hardware interface design of the microcontroller; Introduction to use microcontroller device for debugging; Introduction to solve the problem of design engineering: product design mission statement, putting forward a proposal to design and debug software and hardware systems based on microcontroller. ● **Microcontroller Ⅰ Experiment(1-2) and Microcontroller II Design：** Enhance the basic knowledge of microcontroller design and FPGA design ; Take a practical electronic system based on microcontroller as the example, introducing and analyzing the design processing the design basic ideas; Take a practical electronic system based on FPGA as the example, introducing and analyzing the design processing the design basic ideas; Students are required to solve a practical electronic system design and FPGA system design by themselves using the learned knowledge and skills; ● **FPGA and its application:** General Introduction; Describe the use of methods and techniques for FPGA design software; Introduction methods based on Verilog HDL / VHDL Design, simulation and RTL design; Describe the FPGA design principles and common use of IP blocks; Describe the principle of four commonly used operating skills in FPGA design ;

	Introduces the application of FPGA in electronic products.
Study and examination requirements and forms of examination	● **Microcontroller and its Application(1-2)：** written examination; ● **Microcontroller I Experiment(1-2) :**submit individual design work combined with the oral examination; ● **FPGA and its Application:** written examination; ● **Microcontroller II Design:** submit individual design work combined with the oral examination;
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● Guiyun Tian, Foundation and Application of Microcontroller ,High education press , 2004.11(Second Edition) ● Lucio Dj Jasio ,Programming 16-Bit PIC Microcontrollers in C - Learning to Fly the PIC24, Newnes, 2007 ● MUNDEN , Asic and Fpga Verification: A Guide to Component , ISBN: 0125105819, 2005 ● Peter wilson , Design Recipes for FPGAs , Posts& Telecom Press ,2009(First Edition)

Module designation	Technical Optics
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	3or4or5
Person responsible for the module	Prof. Li Xiangning
Lecturer	Prof. Dr. Jia Hongzhi Associate Prof. Dr. YANG Bo Associate Prof. Dr. PENG Yan Associate Prof. Dr. LIANG binming Associate Prof. Dr. GUO Hanming
Language	English /Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar / discussion, laboratory experiment based on tuition for optical theory.
Workload	Tuition time: 9 hours per week Self-study: 11 hours per week
Credit points	12
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	basic knowledge of geometry, mathematics, physics, Applied Optics , etc.
Module objectives/intended learning outcomes	● **Course goals** Focusing on optical engineering, students will obtain professional and improved knowledge of geometrical optics, wave optics and advanced optics development. ● **Learning objectives** After successful studying of this course module, Students can acquire the following knowledge and skills : 1. Mastering the basic theory of geometrical optics and wave optics. 2. Knowing well about the concepts of the basic laws of geometrical optics, Gaussian optics, aberrations, the light wave properties of interference, diffraction and polarization. 3. Analyzing the aberrations of an optical system, knowing that what's the main aberration, and understanding well about the ideal optical system.

	4. Primary knowledge of lenses, analyzing and designing the optical system by laboratory experiment, such as, microscopy system, telescope system, objective lens and other optical elements. 5. Understanding the typical installations of interference, diffraction, polarization and their applications. 6. Basic theory and dealing method of solving practical optical problems. 7. Knowing how to apply these knowledge into optical system. 8. Expanding student's thinking in the geometrical optics and wave optics field. After learning the optical engineering module, students own the basic characteristic and skills of geometrical optics, wave optics, and can apply them into practice.
Content	● **Optical Engineering (1-2):** **Geometrical Optics:** General Introduction; The basic laws of geometrical optics and the concept of Objects and imaging, Coaxial spherical optical system, Ideal optical system, Planar systems, Beam limits of the optical system, Gaussian optics, aberrations, The overview of aberration, Basis of Photometric and colorimetric, Typical optical system, Modern optical systems. **Wave Optics:** Basic theory of electromagnetic waves; The composition of light waves; The interference of light waves; Typical installation of interference and their applications; The diffraction of light waves; Typical installation of diffraction and their applications; The polarization of light waves; The generation of polarized light waves and their applications; Conclusion. ● **Lab. Applied Optics (1-2)：**

	Strengthen the basic knowledge of optical system through experiments. Take a practical optical system as an example, introducing the imaging process and analyzing the main aberrations of the system. Students are required to set up a practical optical system analyze by themselves with the learned knowledge and skills. ● **Optical system simulation with software ：** Students should learn some related software to simulate optical system function on the basis of understanding theoretical knowledge.
Study and examination requirements and forms of examination	● **Optical Engineering (1-2) :** written examination; ● **Lab. Applied Optics (1-2):** submitting experimental report with analysis. ● **Optical system simulation with software:** submitting experimental report with analysis.
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, and working documents.
Reading list	● Optical Engineering, Modern Optical Engineering, R. R. Donnelley & Sons company, 2000(Third Edition) ● An Liansheng, Applied Optics, Beijing Institute of Technology Press, 2000 ● Cao Junqing, The basis of optical engineering, China Metrology Press,2003 ● Yu Daoyin, Tan Hengying, Optical Engineering, Mechanical industrial Press, 2007(Second Edition) ● Hu Jiasheng, Introduction to Engineering Optics, University of Dalian for Science and Technology Press,2002 ● Jin Qicheng, Colorimetry, Science and Technology Press ,1979

Module designation	Electronics
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	Analog Electronic Technology & Digital Electronic Technology
Courses, if applicable	-
Semester(s) in which the module is taught	3or4
Person responsible for the module	Associate Prof. XIN Shangzhi
Lecturer	Associate Prof. XIN Shangzhi Associate Prof. LIU Jian Associate Prof. QIAN Weikang Lecturer XIE Ming
Language	Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, Lab/16 hours per week
Workload	Tuition time: 12 hours per week Self-study: 15 hours per week
Credit points	16
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic Mathematics A, Physics, electric circuit
Module objectives/intended learning outcomes	● **Course goal：** With an emphasis on the basic knowledge and basic concept of electronic technology, learn the methods of analyze and design of electronic circuits. The students will gain the ability to analyze various circuits and make good foundation for electronic technology and experiments. ● **Learning objectives** Making students : 1. Understand the concepts of employing simple models to represent non-linear and active elements-such as the MOSFET-in circuits. 2. Understand the basic electrical engineering principles and abstractions on which the design of electronic systems is based. 3. Use these engineering abstractions to analyze and design simple electronic circuits. 4. Derive a state diagram from a textual specification according to an appropriate FSM

	model; i.e. sequence recognizers, serial calculators, sequence controllers. 5. Show knowledge about encoding strategies and understand impacts on next state forming logic circuit. 6. Show knowledge to choose synthesizable VHDL coding style and to apply appropriate signal types. 7. Show ability to implement signed integer arithmetic to VHDL modeling of multiply and accumulate data path.
Content	● **Analog Electronic Tech.** 1. PN Junction; 2. Semiconductor Diodes; 3. Semiconductor transistors; 4. Field-Effect Transistors; 5. Basic amplifiers; 6. differential amplifiers; 7. power amplifier; 8. Integrated operational amplifier and applications; 9. feedback; 10. signal generation circuits ● **Digital Electronic Tech.** 1. Boolean algebra and minimization techniques for combinational circuits. 2. Basic introduction into logic gate characteristics and design of sequential circuits. 3. Sequential circuits development methods based on Finite State Machine (FSM) descriptions. 4. Digital system design with VHDL based on FPGA platform. 5. Behavioral system modeling with a VHDL according to the register transfer level (RTL) description style. ● **Lab. Analog Electronic Tech.:** 1. Diodes circuit; 2. Common-Emitter amplifier; 3. Common-Collector amplifier; 4. Multi-stage amplifiers; 5. differential amplifier;

	6. Integrated operational amplifier; 7. Feedback amplifier; 8. Signal generation circuits ● **Lab. Digital Electronic Tech.:** 1. VHDL and Simulation with ModSim6.1. 2. Combinational Circuits Design with VHDL. 3. Synchronous Sequential Circuits Design with VHDL. 4. Digital System Synthesis with FPGA
Study and examination requirements and forms of examination	● **Analog Electronic Tech.:** written examination; ● **Digital Electronic Tech.:** written examination; ● **Lab. Analog Electronic Tech.:** students should do every experiment independently and submit the exercise report for each experiment; ● **Lab. Digital Electronic Tech.:** students should do every experiment independently and submit the exercise report for each experiment
Media employed	ppt projection, whiteboard
Reading list	● Robert Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson Prentice Hall, ISBN: 0136064639, 2008.8 ● Thomas L. Floyd, U.S.A, Digital Fundamentals, Publishing House of Electronics Industry, ISBN: 9787121132575, 2011(Tenth Edition) ● Stephen Brown, Fundamentals of Digital Logic with VHDL Design, China Machine Press, ISBN:0-07-012591-0. ● Meng Xianyuan, Qian Weikang, Embedded System Design with FPGA, Publishing House of Electronics Industry, ISBN:978-7-121-05031-2, 2007 ● Xin Shangzhi, Sun Hao, Qian Jianqiu, Experiment and Practice of Electric circuit & Electronic Technology, Publishing House of Science and Technology, ISBN: 978-7-5478-0945-7, 2011.8

Module designation	Electric Circuits
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	2or3or4
Person responsible for the module	Associate Prof. LI Haiying
Lecturer	Associate Prof. LI Haiying Associate Prof. LI Yufeng
Language	English/Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, Lab/12.5 hours per week
Workload	Tuition time: 9 hours per week Self-study: 11 hours per week
Credit points	12.5
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic Mathematics A, Physics
Module objectives/intended learning outcomes	● **Course goal** With an emphasis on the basic law and basic concept of circuit, students will gain the ability to analyze various circuits using circuit analyzing methods and make good foundation for electric circuit design and experiment. ● **Learning objectives** Making students : 1. to master the basic theory of circuit. 2. to master the various analysis method of circuit. 3. to train the preliminary experimental ability. 4. to train the preliminary ability for circuit design. 5. to utilize the theory knowledge designing correspondent experiments and to train the independent thinking and manual ability.
Content	● **Electrotechnics Foundation：** 1． Circuit variables 2． Circuit elements 3． Simply resistive circuits

	4. Techniques of circuit analysis 5. Inductance, capacitance, and mutual inductance ● **Circuit Principles(1-2)：** 1. Response of first-order RL and RC circuits 2. Natural and step responses of RLC circuits 3. Sinusoidal steady-state analysis and power calculations 4. Balanced three-Phase circuits 5. The Laplace transform in circuit analysis 6. The Fourier Transform in Circuit Analysis 7. Two-Port Circuits ● **Lab. Circuit Principles(1-2)：** 1. Electric instrument measurement error processing method. 2. Testing and verifying Thevenin and Norton theorem 3. Transient response of First-Order circuits 4. RLC serial and parallel resonance 5. Improvement the power factor 6. Three-phase circuit power measurement
Study and examination requirements and forms of examination	● **Electrotechnics Foundation:** written examination; ● **Circuit Principles(1-2):** written examination; ● **Lab. Circuit Principles (1-2):** students should do every experiment independently and submit the exercise report for each experiment.
Media employed	ppt projection, whiteboard
Reading list	● James W.Nilsson. Riedel, Electric Circuits, Electrical Industry Press, 2009.6(Eighth Edition) ● James W.Nilsson, Introductory Circuits for Electrical and computer engineering, Electrical Industry Press, 2007 ● Qu Guanyuan, Circuit Theory, High Education Press.

Module designation	Optoelectronics
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	6
Person responsible for the module	Associate Prof. YANG Yongcai
Lecturer	Prof. Dr. LI Yi Prof. Dr. JIA Hongzhi Prof. Dr. ZHENG Jihong Associate Prof .Dr. ZHANG Rongfu Lecturer FANG Baoying Lecturer DONG Xiangmei
Language	English/Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar / discussion, /10hours per week of the module
Workload	Tuition time: 7 hours per week Self-study: 9 hours per week
Credit points	10
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, electronic and the Technical Optics Module (Applied Optics, Engineering Optics etc)
Module objectives/intended learning outcomes	● **Course goals** With an emphasis on an advanced optics module, students will gain an Professional and improved knowledge of optics, optical system design and advanced optics development. ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes: 1. Master the basic theory of photo-electric and electric-photo conversion. 2. Know well about the characteristics and structures of typical photo-electric and electric-photo conversion devices and elements. 3. Understanding the use of photo-electric and electric-photo conversion devices and

	elements. 4. Expanding student's thinking in optoelectronics field; -It provides a basic theory and dealing method of solving practical optoelectronics problems. - Gaining practical abilities for which knowledge is used in the practical optoelectronics system. - Students will be familiar with the principle, characteristics and structures of typical photo-electric and electric-photo conversion devices and elements. -Understanding how to apply the knowledge into the optoelectronics system from sorts of exercises. - Given primary ability to analyze and design the optoelectronics system based on the photo-electric and electric-photo conversion devices and elements. -It aims the students to own the basic characteristic and skills to work as a primary optical and electrical engineer after learning the optoelectronics module.
Content	● **Optoelectronic Principles:** General introduction -Modern information technology, -Photoelectric information technology, -Photoelectric Measurement, Review the basic knowledge of optics -Basic knowledge of geometric optics -Basic knowledge of wave optics Introduction of quantum optics -Concept of the energy levels, -Band structure of the semiconductor The principle of electric-photo conversion The principle of photo-electric conversion ● **Optoelectron. Devices:** General introduction Introduction of electric-photo conversion -Light –Emitting Diodes (LEDs), -Laser Diodes (LDs), -Superluminescent Diodes (SLDs), -Liquid crystal displays(LCDs), -Organic light-emitting diodes(OLEDs),

	-Polymer light-emitting diodes(PLEDs) -Relative circuits about electric-photo conversion devices. Introduction of photo-electric conversion, -Photomultiplier tube(MPT), -Photodiode, -Phototransistor, -Pyroelectricity detector, -Mercury Cadmium Telluride Detectors , -Opto-isolators, -CCD,PSD and so on. - Relative circuits about photo-electric conversion devices Introduction of the application technology of photoelectric detection ● **Lab. Optoelectronics** Enhance the basic knowledge of optoelectronics; Take a practical electric-photo and photo-electric conversion system as the example, introducing and analyzing the design processing; Students are required to solve a practical electric-photo and photo-electric conversion system design by themselves using the learned knowledge and skills;
Study and examination requirements and forms of examination	● **Optoelectronic Principles:** written examination; ● **Optoelectron. Devices:** written examination; ● **Lab. Optoelectronics:** submit individual design work combined with the oral examination.
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, , and working documents;
Reading list	● Yongcai Yang , Optoelectric Information technology, East China University Publishing Company , 2000 ● S. O. Kasap, Optoelectronics and photonics: Principle and Practices, Publishing house of electronics industry, 2003

Module designation	Laser Technology
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5
Person responsible for the module	Prof. Dr. CHEN Jiabi
Lecturer	Prof. MA Junshan Prof. CHEN Jiabi Associate Prof .Dr. GUO Hanming Associate Prof. Dr. LIANG Binming Associate Prof. Dr. PENG Runling
Language	English/Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar / discussion/6 hours per week of the module
Workload	Tuition time: 4 hours per week Self-study: 5 hours per week
Credit points	6
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, optics and Basic Mathematics
Module objectives/intended learning outcomes	● **Course goals** Help students gain professional and improved knowledge of Laser principle, Laser technology and Laser application. ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes: 1. Grasping the basic principle to create laser. 2. Understanding the output quality of laser. 3. Understanding the characteristics of laser beam and grasping how to transform laser beam. 4. Understanding the application of laser in measurement, fabrication, communication and optical holography etc. 5. Grasping some typical methods of how to apply laser in measurement, fabrication

	etc.
Content	● **Laser Technology:** General Introduction; Interaction between light and matter; Profile of spectrum; Creation of laser; Structure of lasers; Laser mode; Rate equation; Gain; Gain saturation; Field distribution in optical resonant cavity; Transmission characteristics of laser beam in confocal cavity; Gaussian beam and its transfomation by thin lens; Output power of lasers; Frequency-selecting technology; Frequency stabilization technique; Q-switched technique; Modulation and deflection technique for lasers; Solid lasers; Gas lasers; Dye lasers; Semiconductor lasers; Length, velocity, distance and collimation measurement of laser; Laser application in fabrication; ● **Laser Lab. :** Enhance the basic knowledge of laser technology and laser application; Precise displacement measurement by laser interfermetry; Babinet's principle and precision measurement of the diameter of thin thread.
Study and examination requirements and forms of examination	● **Laser Technology:** written examination; ● **Laser Lab.:** submit individual design work combined with the oral examination
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents
Reading list	● Mark Csele, Fundamentals of Light Sources and Lasers, John Wiley & Sons, Inc., Hoboken, New Jersey., 2004 ● Chen Jiabi, Peng Runling, Laser principle and application, Electronic Industry Press, 2008 ● Zhou Bingkun, Gao Yizhi, etc., Laser principle, Electronic Industry Press, 2000 ● Yu Kuanxin, Jiang Tieliang, etc., Laser

	principle and laser technology, Beijing Industry University Press, 1998

Module designation	Optical Commun.
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5
Person responsible for the module	Prof. Dr. MA Junshan
Lecturer	Associate Prof. LIANG Binming Lecturer TAO Chunxian
Language	English/Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar /6hours per week of the module
Workload	Tuition time: 4 hours per week Self-study: 5 hours per week
Credit points	6
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, electronic and the Technical Optics Module (Applied Optics, Engineering Optics etc)
Module objectives/intended learning outcomes	● **Course goals** Enable students to master the basic characteristics of optical fiber communication, as well as the principle of optical fiber communication systems, and lay a solid foundation for future engineering applications and postgraduate studies ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes: 1. Understand the characteristics of optical fiber communication 2. Establish the concept of optical fiber communication systems, understand the history of the development of optical fiber communication 3. Master principle of optical fiber transmission

	4. Master the principle of laser and optical detector 5. Master optical modulator, optical transmitter and optical receiver structure and working principle.
Content	● **Fiber Optics and Opt. Comm. :** Basic knowledge and concepts of development and evolution of the optical fiber communication; Principle of optical fiber transmission; The design principles of optical fibers / cables, optical active /passive components and fiber optic communication system ; Typical fiber transmission systems, optical amplification and wavelength division multiplexing technology ● **Lab. Opt. Comm.** Enhance the basic knowledge of optical fiber communication systems ; Students are required to solve a practical optical fiber communication systems design by themselves using the learned knowledge and skills.
Study and examination requirements and forms of examination	● **Fiber Optics and Opt. Comm. :** written examination; ● **Lab. Opt. Comm :** System operation examination combined with the oral examination
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● Liu Zengji, Optical fiber communication, Xi'an University of Electronic Science and Technology Publishing House ● Chiu Kun, Optical fiber communication systems, University of Electronic Science and Technology Publishing House ● Yang Xianglin, Optical fiber communication systems, National Defence Industry Press

Module designation	Modern optics
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	4or6
Person responsible for the module	Prof. Dr. ZHENG Jihong
Lecturer	Prof. LI Xiangning Prof. CHEN Jiabi Associate Prof. Dr. YANG Bo Associate Prof. Dr. GENG Tao Associate Prof. Dr. GUO Hanming Lecturer ZHANG Wei Lecturer DONG Xiangmei
Language	English/Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, seminar / discussion, professional software practice based tuition for advanced optical system design/11hours per week of the module
Workload	Tuition time: 8 hours per week Self-study: 10 hours per week
Credit points	11
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, electronic and the Technical Optics Module (Applied Optics, Engineering Optics etc)
Module objectives/intended learning outcomes	● **Course goals** With an emphasis on an advanced optics module, students will gain an Professional and improved knowledge of optics, optical system design and advanced optics development. ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes: 1. Correctly identify the optical system; including the basic theory of Fourier Optics, the principle of optical design, the

	basic progress of the optical system design software and the related advanced improvement in optical and electrical research fields. 2. Given detailed criterion of judging the quality of optical imaging such as the MTF curves, the Spot diagram etc. 3. Understanding the use of the advanced software to realize the design objective. 4. Expanding student's thinking in an advanced optics field; -It provides a basic theory and dealing method of solving practical optical problems. - Gaining practical abilities for which knowledge is used in the practical Optical system design. - Students will be familiar with the operation of general optical design software, such as ZEMAX, Code V etc. -Understanding how to apply the knowledge into the optical and electrical system from sorts of exercises. - Given primary ability to design the optical microscopy system, telescope system, objective lens and other optical elements and systems. -Given ability to solve the problem in the complicated opto-electrical system, such as the LED illumination, projection system. - Using the advanced optical theory such as the knowledge the Fourier Optics to evaluate and analysis the optical and electrical system problems. -It aims the students to own the basic characteristic and skills to work as a primary optical and electrical engineer after learning the advanced optics module.
Content	● **Optical Information Processing:** General Introduction; Analysis of Two-dimensional Signals and Systems; Foundations of Scalar Diffraction Theory; Fresnel and Fraunhofer Diffraction;

	Wave-optics Analysis of Coherent Optical systems; Frequency Analysis of Optical Imaging Systems; Optical Transform Function; Holography and holographic optical devices; Optical Information Processing with coherent optical system; Optical Information Processing with white light system; Conclusion; ● **Computer aided optical design:** Review the basic optical design knowledge including confocal system, projection system, telescope system, microscopy system etc; Review the basic imaging aberrations and its characteristics; Introduction the principle and the criteria of judging the optical system design (for example, Strehl judging criteria, Spot diagram; Describe the principle and the basic operations of ZEMAX software; Learning Seven samples for the beginning of using ZEMAX. Providing practicing hours of the students to operate the ZEMAX software; ● **Lab. Optical design** Enhance the basic knowledge of optical design; Take a practical optical system as the example, introducing and analysing the design processing the design basic ideas; students are required to solve a practical optical system design by themselves using the learned knowledges and skills; ● **Academic seminar** Famous scientists in the opto-electrons and information Engineering field and relative fields, such as electrons, physics etc are invited to show an advanced development reports for the under-graduated students. Learning contents includes the Therherz, black silicon, photolytic devices , quantum dots etc. students are required to write the listening report for the academic seminar.
Study and examination requirements	● **Optical Information Processing:** written

and forms of examination	examination; ● **Computer aided optical design:** software operation examination combined with the oral examination; ● **Lab. Optical design:** submit individual design work combined with the oral examination; ● **Academic Seminar:** students should submit the listening report for each seminar.
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● Joseph W.Goodman, Introduction to Fourier Optics, The Mcgraw-hill compnies,Inc, 2000(Second Edition) ● Chen Jiabi, Su Xianyu, Optical information technology and its application, High education press, 2002.7 ● Lv Naiguang, Fourier Optics, Mechanical industrial Press, 2006.4(Second Edition) ● Su Xianyu, Li Jitiao etc, Information optics, Science Press,1999.9 ● Yu Daoyin, Tan Hengying, Optical Engineering, Mechanical industrial press, 2007(Second Edition)

Module designation	Measurem. and Sensor
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	3or6
Person responsible for the module	Prof. Dr. HOU Wenmei and Prof. Dr. YANG Yongcai
Lecturer	Prof. Dr. YANG Yongcai Prof. Dr. HOU Wenmei Prof. Dr. XU Jian Associate Prof. Dr. XU Boqing Lecturer YANG Hui Lecturer NI Yi
Language	English/Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Seminar based tuition with several instrumental instructions / 8 lecture hours per week
Workload	Tuition time: 6 hours per week Self-study: 7 hours per week
Credit points	8
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Analog Circuit and Digital Circuit, Basic courses of physics, electronic and optics
Module objectives/intended learning outcomes	● **Course goals** With an emphasis on the technique of Weak Signal detection, students will gain an Professional and improved knowledge of the noise of the measurement system, Lock-in amplifier, sampling integrator and photon counter. Students should learn basic knowledge of various nano-measurement methods with understanding of the underlying interaction mechanisms. ● **Learning objectives** 1. On successful learning of this course module, the student should be able to demonstrate the following learning outcomes:

	Student shall obtain basic theoretical knowledge of the interference and noise, detecting and controlling weak signal, to grasp the basic methods and skills to design the devices for weak signal measurement and control, to improve the accuracy of measurement to the maximum and reduce its cost as much as possible. 2. Students will learn how to analysis and design measurement process for different tasks. To achieve this purpose the students should also learn the knowledge about nanotechnology, a broad, highly interdisciplinary and still evolving field, one of most promising technology in the new century.
Content	● **Signals and Systems：** This course contains a comprehensive discussion of continuous and discrete time signals and systems with many examples from MATLAB—software used to write efficient, compact programs to solve electrical and computer engineering problems of varying complexity. It discusses Laplace transformation and circuit analysis, impulse response, Fourier series, Z transform, and the Discrete Fourier transform and FFT. Solutions to all exercises are included in this revised edition. ● **Nanometrology：** General introduction: Principle of operation, instrumentation and probes of Scanning Tunneling Microscopy and Atomic Force Microscope and their instrumentation and analyses. Introduction of Nanotechnology: Include micro- and nanofabrication and stamping techniques for micro- and nanofabrication, MEMS/NEMS devices and applications. It will also introduce the basic knowledge of Carbon nanotubes and nanowires. An important area is the fabrications and applications of MEMS/NEMS devices. ● **Weak Signal Detection：**

	Theoretical teaching: The basic concept of noise, the reason for thermal noise and excess noise of resistance, the noise of active device, the design of low-noise preamplifier, the concept of correlation function and correlation receiver, Lock-in amplifier, the correlator of lock-in amplifier, synchronous integrator, the application of lock-in amplifier, the physical process of sampling, sampling theorem, real-time sampling and transform sampling, the principles and ways of working of sampling integrator, the principle of the photon counter, photomultiplier tube in photon counter, amplifier and discriminator, measurement methods of photon counter. Practice: The research of correlator and the measurement of main parameters, know the principle of correlator and its output characterize.
Study and examination requirements and forms of examination	● **Signals and Systems:** Written examination; ● **Nanometrology:** Written examination; ● **Weak Signal detection:** Test score makes up of 60% of the total scores and homework makes up of 40% of the total score
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practising center, and working documents
Reading list	● Yang Yongcai, Weak signal detection Lecture and experiment instructions, Shanghai University for Science and technology Press, 2006 ● Gao Jinzhan, The detection of weak signal, Qinghua University Press,2004 ● Liu Jun, The technology of weak signal detection, Electronic Industry Press,2005 ● Editor-in-Chief Bharat Bhushan, Springer, Handbook of Nanotechnology, 2004

Module designation	Elective Course-Image Processing
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Associate Prof. Dr. CHEN Qing
Lecturer	Associate Prof. Dr. XU Boqing Lecturer Dr. HAN Yanfang Lecturer Dr. WANG Yingkun
Language	English /Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture, seminar / discussion, lab work, 2 hours per week
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Prerequisites by Topic: 1. Mastery of Matlab programming language. 2. Familiarity with calculus and statistics. 3. Exposure to linear algebra and linear systems.
Module objectives/intended learning outcomes	The aim of this course is to introduce students the necessary background, the basic principles and concepts, the typical algorithms, and the applications of digital image processing. To know and understand how computers can process digital images. To know some of the basic operations (their basis, implementation and consequences) in image processing. To know of the relation to signal processing and other fields.
Content	Theoretical Contents 1. Introduction: Overview of Image Processing and its applications. 2. Digital Image Fundamentals: Image digitization, basic relationships between pixels, linear and nonlinear operations.

	3. Image Enhancement in the Spatial Domain: Gray-level mapping, histogram, Spatial-domain filter, Edge detection. 4. Image Enhancement in the Frequency Domain: Fourier transformation, Frequency domain filtering. 5. Color Image Processing: Color fundamentals, Color models, pseudocolor image processing, Color image smoothing and sharpening. 6. Image Compression: Image compression models, Lossless compression versus lossy compression, image compression standards. Lab works: 1. MATLAB & Image Processing Toolbox 2. Implementation of gray scale transformations, spatial and frequency filtering 3. Implementation of image compression Seminar 4. Discussion of recent advances and current research trends in digital image processing theory, algorithms and their applications
Study and examination requirements and forms of examination	The semester grade will be based upon assignments issued in class (20%), lab works (25%), seminar / discussion (5%), and a comprehensive final examination (50%).
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● Text book R. C. Gonzalaz, Digital Image Processing, Publishing House of Electronics Industry, 2002(Second Edition) ● References Kenneth R. Castleman, Digital Image Processing, Qinghua University Press, 2000 Additional supplementary materials will be provided as needed. ● Laboratory References Rafael C. Gonzalez, Richard E. Woods, & Stevev L., Digital Image Processing using Matlab, Publishing House of Electronics Industry, 2004

Module designation	Elective Course-Photovoltaic Tech.
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Prof. Dr. ZHU Yiming
Lecturer	Prof. Dr. ZHU Yiming Lecturer XU Gongjie
Language	English
Relation to curriculum	Elective
Type of teaching, contact hours	Classroom, class assignments and discussions combined. 2 hours per week
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Advanced Mathematics, University physics, semiconductor physics, electronic technology
Module objectives/intended learning outcomes	This course is the optical and electronic information engineering undergraduate professional training. It is a basic required course, to introduce the principles and the basic applications of the photovoltaic technology, focusing on working principles and applications of photoelectric sensors, the transformation and processing of the photovoltaic signals. The objective of the course is designed to achieve the ability to train students in scientific and technological innovation. Basic elements include: the status and role of the photoelectric sensor, definitions, classifications, trends, selection principles, general characteristics and some basic knowledge; describes the manufacturing of photovoltaic cells, the design of photovoltaic system, the processing of

	photovoltaic materials and other new technologies. We aim to cultivate the undergraduate students into a potential researcher or project designer through the study.
Content	**Chapter 1. Summary and Subject** 1. Microelectronics manufacturing introduction 2. Semiconductor substrate Requirements: to master the history of the semiconductor industry, as well as fundamentals of semiconductor materials. **Chapter 2. Single Process Technology1:Heat treatment & Single process** 1. Diffusion 2. Thermal oxidization 3. Ion implantation 4. Rapid thermal process Requirements: to master the processes and methods of diffusion, thermal oxidation, ion implantation and rapid thermal annealing in IC technology. **Chapter 3. Single Process Technology2:Pattern Transfer** 1. Optical lithography 2. Photoresist 3. Non-optical lithography 4. Vacuum etching & plasma 5. Etching Requirements: to master various pattern transfer methods and processes in IC technology, including lithography, ion beam etching, and vacuum etching technology; to understand the photoresists' features.
Study and examination requirements and forms of examination	Test results based on class notes, class assignments and class discussion, final reports assessed.
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents
Reading list	● Didier Decoster, Joseph Harari, Optoelectronic Sensors, Wiley-ISTE,

	ISBN: 978-1-84821-078-3, 2009.8 ● USA Stephen, A.Campbelln, The Science and Engineering of Microelectronic Fabrication, Electronics Industry Publishing House

Module designation	Elective Course-Measurement and Control Circuits
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Prof. MU Pingan
Lecturer	Prof. MU Pingan Lecturer HU Qi
Language	Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture / 2hours per week of the module
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of Analogical electronic technique and Digital electronic technique
Module objectives/intended learning outcomes	● **Course goals** MCC module emphasizes on how to establish a bridge between electronic technology and measurement & control. By using electronic technology, students can deal with various signal processing problems of measurement & control system. ● **Learning objectives** On successful learning of MCC module, the student should be able to demonstrate the following learning outcomes: 1. Be Familiar with composition and basic principle of all kinds of measurement & control circuit prototype. 2. Mastering common functional circuit of measurement & control system, the related advanced technology in measurement & control field. 3. Understanding design methods and applied technology of measurement &

	control circuit. 4. Getting an all-round understanding of anti-interference technology of the measurement & control system. -It provides a basic theory and processing method of solving practical measurement & control problems. -Fostering students' practice ability and further improve their ability of innovation consciousness. -Given primary ability to design and select electronic instrument and functional circuit reasonably. -Improving ability to analysis circuit and test circuit performance during debugging -It aims the students to own the basic knowledge and skills to work as a measurement and control engineer after learning MCC module.
Content	General Introduction; Signal amplification circuit; Signal modulation and demodulation circuit; Signal separation circuit; Signal computation circuit; Signal conversion circuit; Signal subdivision and differentiate direction circuit; Continuous signal-controlled circuit.
Study and examination requirements and forms of examination	written examination
Media employed	Beamer and board/whiteboard
Reading list	● Zhang GuoXiong, Measurement and control circuit, Mechanical Industry Press, 2008.1(Third Edition) ● Zhang GuoXiong, Shen ShengPei editor, Precision instrument circuit, Beijing: Mechanical Industry Press, 1988 ● Li gang, Lin Ling editor, Modern measurement and control circuit, Beijing: Higher Education Press, 2004

Module designation	Elective Course-Infrared technology
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Prof. Dr. JIA Hongzhi
Lecturer	Associate Prof. SUI Guorong Lecturer HU Qi
Language	English /Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture, seminar / discussion, /2hours per week of the module
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, electronic
Module objectives/intended learning outcomes	● **Course goals** With an emphasis on the infrared technology, students will gain professional and improved knowledge of infrared technology and advanced infrared technology development. ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes: 1. Correctly identify the infrared system; including the basic theory of infrared radiation, the principle of infrared devices, the structure of the infrared system and the related advanced improvement in infrared technology research fields. 2. Understanding the relative circuit in the infrared system. 3. Expanding student's thinking in an advanced infrared technology field; -It provides a basic theory and dealing method

	of solving practical infrared problems. - Gaining practical abilities for which knowledge is used in the practical infrared system. - Students will be familiar with the structure of the infrared system. -understanding how to apply the knowledge into the infrared system from sorts of exercises. -Given primary ability to analyze and design the simple infrared system. -It aims the students to own the basic characteristic and skills to work as a primary optical and electrical engineer after learning the infrared technology module.
Content	General Introduction; The basic theory of infrared radiation and transmission; Introduction to the infrared radiation sources; The principle of infrared radiation transmitted in the atmosphere; Infrared optical system; Infrared detectors; Relative circuit of infrared system; Modulators in the infrared system; Introduction to the typical infrared systems.
Study and examination requirements and forms of examination	**Infrared Technology:** written examination;
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, and working documents;
Reading list	● Zhang Jianqi et. al., Infrared physics, Publishing House of Xidian University, 2004 ● Xu Ganqing, Infrared physics and technology, Publishing House of Xidian University, 1989 ● Chen Yongpu, Infrared radiation, infrared devices and their typical applications, Publishing House of Electronics Industry, 2004

Module designation	Elective Course-Thin film technology
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Prof. Dr. ZHANG Dawei
Lecturer	Prof. Dr. ZHANG Dawei Lecturer TAO Chunxian
Language	English /Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture, seminar / discussion, professional software practice based tuition for optical film design/2hours per week of the module
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of Physics, Optics, Material Technology
Module objectives/intended learning outcomes	● **Course goals** Gain an Professional and improved knowledge of the science and engineering of optical film, such as substrate preparation, film design, heat treatment, spectrum, and related design & deposition technology. ● **Learning objectives** On successful learning of this course, the student should be able to demonstrate the following learning outcomes: 1. Understand the principles of Maxwell, and correctly identify the different design and application for functional film. 2. Master the fundamental and techniques of film design and deposition method. 3. Correctly select the right substrate and coating materials.

	4. Compare different thin film technologies, and select the right method to form a thin film. By Interactive teaching and learning, students will practice their independent skills of investigation, manuscripts written and oral report.
Content	An introduction to thin film technology, Functional film design and application, include LED color film, Sensor film, laser film, and transparent conductive film, Thin films deposition, include physical deposition: evaporation and sputtering, chemical vapor deposition, and epitaxial growth, Conclusion;
Study and examination requirements and forms of examination	**Thin film technology** :Examination and homework
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, and working documents;
Reading list	● H Angus Macleod, Thin-film optical filters, Institute of physics publishing, 2001(Third Edition)

Module designation	Elective Course-Modern illumination technology
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Associate Prof. Dr. YANG Bo
Lecturer	Associate Prof. Dr. YANG Bo Lecturer ZHANG Wei
Language	Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture / tuition for illumination optical system design using professional software/2hours per week of the module
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of optics, electronic and the Technical Optics Module (Applied Optics, Engineering Optics etc)
Module objectives/intended learning outcomes	● **Course goals** Learn basic knowledge of Radiometry and Photometry. Familiar with commercial CAD software for illumination system and Mechanical software. Have the ability of analysis and design of modern illumination system. ● **Learning objectives** On successful learning of this course module, the student should be able to demonstrate the following learning outcomes: 1. Correctly identify the illumination system; including the basic theory of Radiometry and Photometry, the basic progress of the optical system design software and the related advanced improvement in optical and electrical

	research fields. 2. Given detailed criterion of judging the quality of illumination such as the illumination uniformity etc. 3. Have the abilities for solve the practical illumination problems. - Familiar with the operation of general optical and mechanical design software, such as Lighttools, etc. - Given primary ability to design the illumination. -Given ability to solve the problem in the complicated opto-mechanical system, such as the LED illumination, projection system.
Content	Review the basic knowledge of Radiometry and Photometry; Review the basic illumination system and its characteristics; Introduction the principle and the criteria of evaluating the illumination system design (for example, illumination uniformity, Light distribution curve , efficiency, ect; Describe the principle and the basic operations of Lighttools software; Learning severial samples for the beginning of using Lighttools; Providing practicing hours of the students to operate the Lighttools software.
Study and examination requirements and forms of examination	**Modern illumination technology :** software operation examination combined with submitting individual design work.
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● Roland Winston, Juan C. Minano and Pablo G. Benitez, Nonimaging Optics, Academic Press,2005 ● Yu Daoyin, Tan Hengying, Optical Engineering, Mechanical Industrial Press, 2007(Second Edition) ● Document Library of Lighttools software.

Module designation	Elective Course-Optical information network
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Lecturer CHEN Kejian
Lecturer	Lecturer CHEN Kejian
Language	Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture, seminar, discussion/2hours per week of the module
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, Information Technology, Electronic and the Technical Optics Module (Applied Optics, Engineering Optics etc)
Module objectives/intended learning outcomes	● **Course goals** By study this course, students will gain an Professional and improved knowledge of Optical Interconnect, Fiber communication, Free space optical communication, and their related optoelectronic devices. ● **Learning objectives** On successful learning of this course, the student should be able to demonstrate the following learning outcomes: 1. Understand the principles of modern communication, Correctly identify the optical communication technology in different scales. 2. Master the knowledge of the high-capacity information processing and related applications. 3. Correctly identify the key optoelectronic devices used in optical information network, and their fabrication technology.

	4. Understand the management strategies of the intelligent optical network. By Interactive teaching and learning, students will practice their independent skills of investigation, manuscripts written and oral report.
Content	Introduction of fundamental network theory and network architecture; Fiber communication and related devices, Integrated all-optical network and semiconductor processing technology; Free space communication in sighting distance and satellite communication; Operation and maintenance of the optical information Network; Conclusion.
Study and examination requirements and forms of examination	Submit individual investigation report combined with the oral examination
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, and working documents;
Reading list	● Rajiv Ramaswami, Kumar N. Sivarajan, Optical Networks: A Practical Perspective, Morgan Kaufman Publishers ,2002(Second Edition) ● Xianzhi Hu, Optical Devices With Applications, Publishing House of Electronics Industry, 2010 ● Ray T. Chen and Chulchae Choim, Optical Interconnects, Morgan & Claypool ,2007 ● Gin´es Lifante, Integrated photonics: fundamentals, Wiley ,2003

Module designation	Elective Course-Integrated Circuit Manufacturing Tech.
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Prof. Dr. ZHU Yiming
Lecturer	Prof. Dr. ZHU Yiming Lecturer XU Gongjie
Language	English
Relation to curriculum	Elective
Type of teaching, contact hours	Combination of class teaching, assignment and discussions./2 hours per week
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Advanced Mathematics, University physics, semiconductor physics, electronic technology
Module objectives/intended learning outcomes	The purpose of this course is to systematically introduce the scientific principle and engineering technique in microelectronic fabrication for Optical-Electrical information division and metrical-controlled technology and equipment division (also for most science and engineering divisions). It covers some basic individual processes involved the IC manufacturing, which include thin films technology, lithography, vapor epitaxial growth methods and so on. For each individual process, its physical and chemical principle is presented, as well as its corresponding necessary equipment. These can help the students to known the advanced development of modern semiconductor IC technology, and to master some process techniques. This

	course is aimed at the next 10 years of industrial development, the industrial adjustment and innovations, training a batch of semiconductor professional for national need. Notes: In real work, local engineers have to communicate with foreign engineers directly in English, since the key techniques of semiconductor IC fabrication lie in hands of American and European enterprises. Therefore, it is important to start a complete English course. It can enable students to acquire the professional knowledge, as well as the professional English words. It also help students who will contribute to semiconductor fabrication career to establish professional technique background and language basis.
Content	**Chapter 1. Single Process Technology3: Thin Film** 1. Physical deposition: evaporation & sputtering 2. Chemical vapor deposition 3. Epitaxial growth Requirements: to master the thin films process in semiconductor IC technology, including the processes of thermal evaporation to form thin films, magnetic-controlled sputtering, chemical vapor deposition, and liquid phase epitaxial growth technique. **Chapter 2. Integration Technology** 1. Isolation, contact and metallization of devices 2. CMOS Technology 3. GaAs Technology 4. Silicon bipolar technology 5. MEMS 6. IC Manufacturing Requirements: to understand the semiconductor integration technology, including CMOS integrated technology, GaAs growth techniques, MEMS

	technology, and manufacturing technology of RF IC.
Study and examination requirements and forms of examination	Assessments based on class notes, assignments, discussions and final reports
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	● USA Stephen, A.Campbelln, The Science and Engineering of Microelectronic Fabrication, Electronics Industry Publishing House ● USA. S. M. Sze, Semiconductor physics and devices, Science Press

Module designation	Elective Course-The photoelectron emitting and display:
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Associate Prof. Dr. YANG Bo
Lecturer	Prof. LI Meng Chao Prof. Dr. ZHANG Dawei
Language	English /Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture, seminar, discussion, / 2 hours per week of the module
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, electronic and Engineering Optics etc
Module objectives/intended learning outcomes	● **Course goals** Introduce many kinds of popular display technology in modern display field. Make students have an overall view about the photoelectron emitting and display technology. ● **Learning objectives** On successful learning of this course module, students should be able to demonstrate the following learning outcomes: 1. Correctly understanding the working principle of 8 kinds of display device; 2. Know the characteristic of different kinds of display device; 3. understanding the fabrication process of the LCD and PDP; 4. Expanding student's thinking in modern display field; -It provides an overall view about the

	photoelectron emitting and display technology. -Students will understand the main fabrication methods and process of the most popular display device. -It aims to guide students to know the recent development of the display technology after learning this course.
Content	General Introduction; Liquid crystal display; Plasma display panel; Projector display; Stereoscopic display; Light emitting diode; Organic light-emitting diode; Electro luminescence device; Field emission display; Conclusion.
Study and examination requirements and forms of examination	**The photoelectron emitting and display:** students should submit an individual technical report about the development of the modern display technology after this course.
Media employed	electronic scripts, ppt projection,
Reading list	● Yu Shengjun, Jiang Quan, Zhang Lei, Display Device and Technology, National defense industry press, 2010.7 ● Li Wenfeng, Gu Jie, Zhao Yahui, Lv Yingli, Optical Electronic Display Technology, Tsinghua University Press, 2010.2 ● Wang Xiufeng, Cheng Bing, Material and Technology of Modern Display, Chemical industrial press, 2009.3

Module designation	Elective Course-Biological optical measurement
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5or6
Person responsible for the module	Lecturer JIANG Minshan
Lecturer	Lecturer JIANG Minshan Lecturer NIYi
Language	English /Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture, seminar /2 hours per week of the module
Workload	Tuition time: 1 hours per week Self-study: 1 hours per week
Credit points	2
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of Optical Engineering
Module objectives/intended learning outcomes	● **Course goals** With an emphasis on an biomedical optics module, students will gain an Professional and improved knowledge of the principle, development and applications of biomedical optics. ● **Learning objectives and skills** On successful learning of this course module, the student should be able to understand the principles of common imaging methods used for biomedical optics, explain the working principles and process of the biomedical optical devices，expanding student's thinking in an advanced optics field. It aims the students to own the basic characteristic and skills of biomedical optics after learning the advanced optics module.
Content	Introduction. Radiative transfer equation and diffusion theory.

	Sensing of optical properties and spectroscopy. Ballistic imaging and microscopy. Optical coherence tomography. Mueller optical coherence tomography. Diffuse optical tomography. Photoacoustic tomography. Ultrasound-modulated optical tomography.
Study and examination requirements and forms of examination	**Biomedical Optics:** written examination
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection and working documents;
Reading list	● Wang LV, Wu H. Biomedical optics: principles and imaging, Wiley-Blackwell, 2007 ● Xu Kexin, Gao Feng, Biomedical Optics, Science Press, 2011