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 Theo 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-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

Content

Natural Science Fundamental Module 134
Basic Mathematics A 134
Basic Mathematics B 139
Physics 141
FG Module 145
Computer Science 145
Microcontroller 149
Technical Optics 152
Electronics 155
Electric Circuits 158
FV Module 160
Optoelectronics 160
Laser Technology 163
Optical Commun. 166
Modern Optics 168
Measurem. and Sensors 172
Elective Course Module 175
Image Processing 175
Photovoltaic Techn. 177
Measurement & Control Circuits 180
Infrared Technology 182
Thin Film Technology 184
Modern Illumination technology 186
Optical Information Network 188
Integrated Circuit Manufacturing Teh. 190
The Photoelectron Emitting and Display 193
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	AssociateProf. Dr. CAOWeili
Lecturer	Prof. JIA Gao Associate Prof.WEIGongming AssistantProf.YU Zhixian Lecturer LIU Ling Lecturer 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 knowledgefor elementary Mathematics and elementary physics
Module objectives/intended learning outcomes	· **Course goals** Calculus is a deductive science and 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 developme 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 fie This course will also [redacted] 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 othe hand, they should skillfully compute partial derivatives and multiple integrals. The intended learning outcome 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, Derivativ

	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 the 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, high-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 [illegible] [illegible] Be familiar with applications of [illegible] 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 definite 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 u definite integral. **Chapter 7 Introduction to differential equations** Understand the basic concept of differential equation 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; Computatio right angled, cylindrical and spherical surface coordinates. Applications: geometry and physics. **Curve integrals and surface integrals** Curve integral for arc length; Curve integral for integral for area; Surface integral for coordinate;

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, 2011.10 · Learning guidance of Linear Algebra, University of Shanghai for Science and Technology, Hunan Science and Technology Press, 2011.01 · Linear Algebras, Tongji University, Higher Education Press, 2000.1 · Higher mathematics 2, 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 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 ski 3. Master basic concepts about Probability Theory a Mathematical Statistics; understand the basic theory and method; realize the processing of the phenomen of random basic idea and method; develop the ability solve practical problems using the method of probabi 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 serie residue. 2. Integral Transformation. This part includes Fourie transformation, Laplace transformation.
Study and examination requirements and forms of examination	· **Stochastic(Prob. and Statistics):** 30% for homework and attendance, 70% for final written examinatior · **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 10 hours 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 ar 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 [illegible] 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 Phys 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 Univers 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 Univer 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 Phy 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 & 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	AssociateProf. Dr. ZHANGXuedian
Lecturer	AssociateProf. ZANGJingSong LecturerLI Zhenqing Lecture ILU Lixia LecturerHUANGXiaoyu
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 Selfstudy: 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 experienc
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 engin 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 syste 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 th course. 5. Be able to read and modify a substantial program it is written in exemplary style. 6. Be able to develop a program and debug a progra 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;

	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, functions 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 [redacted] 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 ar apprehension of the basic theories, procedures and skills of drawing, for studen ts 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 Ritchieand Brian W Kernighan, The C Programming Language, 2007 (second edition) · Hu Lin, Engineering drawing, Mechanical industri Press, 2006 · GaryJ.Bronson, A First Book of ANSI C,(Fourth Edition) · Al Kelley and Ira Pohl , A Book on C : Programmi in C, 2004(Fourth Edition) · Stewart Venit, Elizabeth Drake, 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 Universi (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	AssociateProf.JIANXianZhong
Lecturer	AssociateProf.ZHANGHuiLin AssociateProf.XIAOErLiang Associate ProfSUI Guorong LectureHU Qi LectureFANGBaoying
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 Selfstudy: 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 singlechip microcomputers, the instruction sets 2. Mastering the working principle of FPGA 3. Understandingassembly language programming skills, interface technology and practical applications 4. Understanding to design a simple microcontroller applications

	5. MasteringFPGA design from RTL design, functior simulationand synthesis 6. Mastering to accomplish complex logic design independently 7. Understanding to use FPGA designing embedde system
Content	· **Microcontroller and its Application(1-2):** General Introduction; Introductionthe structure and working principle of the microcontroller; Introduction microcontroller addressing modes, instruction setsand its application design; Introduction Hardware interface design of the microcontroller; Introductionto use microcontroller device for debugging; Introductionto solve the problem of design engineerir product design mission statement, putting forward a proposal to design and debug software and hardware systems based on microcontroller · **Microcontroller Experiment(1-2) and Microcontroller II Design** Enhance the basic knowledgeof microcontrollerdesign and FPGA design ; Take a practical electronic system based on microcontrolleras the example, introducing and analyzingthe design processusing the design basic ideas; Take a practical electronic system based on FPGA as the example, introducing andanalyzingthe design processing the design basic ideas; Students are required to solve a practical electronic system design and FPGA system designthemselves using the learned knowledgeand skills; · **FPGA and its application:** General Introduction; Describethe use of methods and techniques for FPGA design software; Introductionmethods based onVerilog HDL / VHDL Design, simulation and RTL design; Describethe FPGA design principles and common use 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	· GuiyunTian

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 AssociateProf. Dr.YANG Bo AssociateProf. Dr. PENG Yan AssociateProf. Dr. LANG binming AssociateProf. 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, aberration the light wave properties of interference, diffraction and polarization. 3. Analyzing the aberrations of an optical system, [illegible] understanding well about the ideal optical system

	Strengthen the basic knowledge of optical system through experiments. Take a practical optical system as an example, introducing the imaging process and analyzing the ma aberrations of the system. Students are required to set up a practical optical system analyze by themselves with the learned knowledge ar skills. · **Optical system simulation with software** Students should learn some related software to simul 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. 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	AnalogElectronic Technology & Digital Electronic Technology
Courses, if applicable	-
Semester(s) in which the module is taught	3or4
Person responsible for the module	AssociateProf. XIN Shangzhi
Lecturer	AssociateProf. XIN Shangzhi AssociateProf. LIU Jian AssociateProf. QIAN Weikang LecturerXIE Ming
Language	Chinese
Relation to curriculum	Obligatory
Type of teaching, contact hours	Lecture, Lab16 hours per week
Workload	Tuition time:12 hours per week Selfstudy: 15 hours per week
Credit points	16
Requirements according to the examination regulations	Homework ,Performance and intermediate examination 30%;Final examination 70%.
Recommended prerequisites	

	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

4 Techniques of circuit analysis

5. Inductance, capacitance, and mutual inductance

.

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 10 hours 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 th 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 ar improved knowledge of optics, optical systen design and advanced optics development. · **Learning objectives** On successful learning of this course module the student should be able to demonstrate th 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. [redacted] 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 improve 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 equati 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; [illegible] 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 principl and application, Electronic Industry Press, 2008 · Zhou Bingkun, Gao Yizhi, et al, Laser principle, Electronic Industry Press, 2000 · Yu Kuanxin, Jiang Tieliang, et al, Laser

	principle and laser technology, Beijing Industry University Press, 1998

Module designation	OpticalCommun.
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 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, electronic and th 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 th 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 communications systems ; Students are required to solve a practical optical fiber communications 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 11 hours 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 th 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 systen design and advanced optics development · **Learning objectives** On successful learning of this course module the student should be able to demonstrate th following learning outcomes: 1. Correctly identify the optical system; including the basic theory of Fourier Optics, the principle of optical design, the

	Wave-optics Analysis of Coherent Optical systems; Frequency Analysis of Optical Imaging Syste Optical Transform Function; Holography and holographic optical devices; Optical Information Processing with coherent optical system; Optical Information Processing with white ligh 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 examp Strehl judging criteria, Spot diagram; Describe the principle and the basic operatio 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 examp introducing and analysing the design processing the design basic ideas; students are required to solve a practical optical system design by themselves using th learned knowledges and skill; · **Academic seminar** Famous scientists in the opto-electrons and information Engineering field and relative fields, such as electrons, physics etc are invi to show an advanced development reports fo 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, 2003(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 optic Science Press, 1999.9 · Yu Daoyin, Tan Hengying, Optical Engineering, Mechanical industrial press, 2007(Second Edition)

Module designation	Measurem. and Sens
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 gras 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 o most promising technology in the new centur
Content	· **Signals and Systems** This course contains a comprehensive discussion of continuous and discrete time signals and systems with many examples fro MATLAB® software used to write efficient, compact programs to solve electrical and computer engineering problems of varying complexity. It discusses Laplace transformati and circuit analysis, impulse response, Fourie 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 ar 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 sampli integrator, the principle of the photon counter, photomultiplier tube in photon counter, amplifier and discriminator, measurement methods of photon counter. Practice The research of correlato and the measurement of main parameters, know the principle of correlato and its output characterize.
Study and examination requirements and forms of examination	· **Signals and Systems:** Written examination; · **Nanometr3 EMC /P 2MCID 53/Lang (en- Tf**

Module designation	ElectiveCourse-Image Processing
Module level, if applicable	-
Code, if applicable	-
Subtitle, if applicable	-

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

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 LecturerXU 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 intermediat examination 30%;Final examination 70%.
Recommended prerequisites	Advanced Mathematics, University physic 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 t 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 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 a 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 transfermethods and processes in IC technology, including lithography, ion bea etching, and vacuum etching technology;
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
· USA Stephen, A.Campbell, The Science and Engineering of Microelectronic Fabrication, Electronics Industry Publishing Hous

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 for 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.

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 th following learning outcomes: 1. Correctly identify the infrared system; including the basic theory of infrared radiatio the principle of infrared devices, the structure of the infrared system and the related advanced improvement in infrared technolog research fields. 2. Understanding the relative circuit in the infrared system. 3. [redacted] advanced infrared technology field; -It provides a basic theory and dealing metho

	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 o 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	ElectiveCourseThin 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. ZHANGDawei
Lecturer	Prof. Dr. ZHANGDawei LecturerTAOChunxian
Language	English /Chinese
Relation to curriculum	Elective
Type of teaching, contact hours	Lecture, seminar / discussion, professiona software practice based tuition for optical film design/2hours per weekof 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 intermediat

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 practic illumination problems. - Familiar with the operation of general optical and mechanical design software, such as Lighttools, etc. - Given primary abi lity to design the illumination. -Given ability to solve the problem in the complicated opto-mechanical systems, 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 several 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	LecturerCHENKejian
Lecturer	LecturerCHENKejian
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 Op 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 Interact

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 LecturerXU Gongjie
Language	English
Relation to curriculum	Elective
Type of teaching, contact hours	Combination of class teaching, assignmer 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 intermediat examination 30%;Final examination 70%.
Recommended prerequisites	Advanced Mathematics, University physic 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 chemi principle is presented, as well as its corresponding necessary equipment. Thes 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 communicate with foreign engineers directly in English, since the key technique of semiconductor IC fabrication lie in hand 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 basi
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 report
Media employed	Beamer and board/whiteboard, electronic scripts, ppt projection, computer practicing center, and working documents;
Reading list	· USA Stephen, A.Campbell, 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 pe 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 intermediat examination 30%;Final examination 70%.
Recommended prerequisites	Basic knowledge of physics, electronic an 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 proces of the LCD and PDP; [redacted] 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	LecturerJIANGMinshan
Lecturer	LecturerJIANGMinshan LecturerNIYi
Language	English /Chinese

	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 Opti Science Press, 2011