

台灣聯合大學系統 113 學年度【電機類】碩士班聯合招生考科訊息

考科/代碼	電子學 (3001)
考科綱要	(1) Operational Amplifiers. (2) Diodes. (3) MOS Field-Effect Transistors (MOSFETs). (4) Bipolar Junction Transistors (BJTs). (5) Single-Stage Amplifiers. (6) Differential and Multistage Amplifiers. (7) Feedback.
參考書目	不提供

考科/代碼	資料結構 (3002)
考科綱要	1. Arrays 2. Stacks and Queues 3. Linked Lists 4. Sorting 5. Hashing 6. Trees 7. Graphs
參考書目	Ellis Horowitz , Sartaj Sahni, and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2nd Ed., Silicon Press, 2007/2008.

考科/代碼	工程數學 A (3003)
考科綱要	<ul style="list-style-type: none"> ● Linear Algebra Vector spaces; Linear transformations; Matrix algebra; Systems of linear equations; Determinants; Eigenvalues and Eigenvectors; Inner product space or orthogonal space. ● Complex Analysis Complex numbers and functions; Complex integration; Power series, Taylor series; Laurent Series, Residue integration. ● Ordinary Differential Equations 1st and 2nd-order ODEs; Higher-order ODEs; System of ODEs, phase plane, qualitative methods; Series solutions of ODEs; Laplace transforms, Fourier analysis.
參考書目	1. E. Kreyszig, <i>Advanced Engineering Mathematics</i> , 10th ed., John Wiley & Sons, Inc., 2011. 2. C. H. Edwards and D. E. Penney, <i>Elementary Differential Equations with Boundary Value Problems</i> , 6th ed., Pearson, 2008. 3. P. V. O’Neil, <i>Advanced engineering mathematics</i> , 8 th ed., Cengage Learning, 2018. 4. S. H. Friedberg, A. J. Insel, and L. E. Spence, <i>Linear Algebra</i> , 4th ed., Prentice Hall, 2003. 5. Gilbert Strang, <i>Introduction to Linear Algebra</i> , 5th Edition, Wellesley-Cambridge Press, 2016. 6. S. J. Leon, <i>Linear Algebra with Application</i> , 9th ed., Pearson, 2014. 7. H. Anton, <i>Elementary Linear Algebra</i> , 9th ed., Wiley, 2005. 8. D. G. Zill and P. D. Shanahan, <i>Complex Analysis: A First Course with Applications</i> , 3rd ed., Jones & Bartlett Learning, 2015.

考科/代碼	工程數學 B (3004)
考科綱要	<ul style="list-style-type: none"> ● Linear Algebra Systems of linear equations; Determinants; Matrix algebra; Vector spaces; Linear transformations; Eigenvalues and eigenvectors; Orthogonality; Inner product space. ● Probability Sample space and probability; Discrete random variables; Continuous and general random variables; Conditional probability and independence; Conditional expectation and variance; Moments and transforms; Limit theorems.
參考書目	<ol style="list-style-type: none"> 1. G. Strang, Linear Algebra and Its Applications, 4th edn, Cengage Learning, 2006. 2. L. E. Spence, A. J. Insel, S. H. Friedberg, Elementary Linear Algebra, 2nd edn, Pearson Education Limited, 2014. 3. W. Cheney and D. Kincaid, Linear Algebra: Theory and Applications, 2nd edn, Jones & Bartlett Learning, 2012. 4. S. J. Leon, Linear Algebra with Application, 9th edn, Prentice Hall, 2015. 5. D. C. Lay, S. R. Lay, J. J. McDonald, Linear Algebra and Its Applications, 5th edn, Pearson Education Limited, 2016. 6. H. Anton and C. Rorres, Elementary Linear Algebra with Supplemental Applications, 11th edn, John Wiley & Sons, 2015. 7. E. Kreyszig, Advanced Engineering Mathematics, 10th edn, John Wiley & Sons, Inc., 2011. 8. S. Ross, A First Course in Probability, 10th edn, Pearson Educational Limited, 2020. 9. D. P. Bertsekas and J. N. Tsitsiklis, Introduction to Probability, 2nd edn, Athena Scientific, 2008. 10. S. Ghahramani, Fundamentals of Probability with Stochastic Processes, 4th edn, CRC Press, 2019. 11. R. E. Walpole, R. H. Myers, S. L. Myers, and K. Ye, Probability & Statistics for Engineers & Scientists, 9th edn, Pearson, 2011. 12. R. D. Yates and D. J. Goodman, Probability and Stochastic Processes, 3rd edn, John Wiley & Sons, 2015. 13. N. A. Weiss, A Course in Probability, Pearson Education Limited, 2006.

考科/代碼	工程數學 C (3005)
考科綱要	<ol style="list-style-type: none"> (1) Differential Equations 1st and 2nd order ODEs, Higher-order ODEs, System of ODEs, Series solutions of ODEs, Laplace transforms, Fourier series methods, Partial differential equations and boundary value problems. (2) Linear Algebra Vector spaces, Matrix algebra, Systems of linear equations, Determinants, Eigenvalues and Eigenvectors, Diagonalization, Inner product spaces, Orthogonal spaces, Linear transformations.
參考書目	(1) E. Kreyszig, Advanced Engineering Mathematics, 10th ed., John Wiley &

	<p>Sons Inc. (Chapters 1- 8, 11 and 12)</p> <p>(2) D. G. Zill and W. S. Wright, Advanced Engineering Mathematics, 5th, 6th or 7th ed., Jones & Bartlett Learning. (Chapters 1-5, 7, 8, 10, 12 and 13)</p> <p>(3) S. H. Friedberg, A. J. Insel and L. E. Spence, Linear Algebra, 4th or 5th ed., Pearson. (Chapters 1-6).</p> <p>(4) L. E. Spence, A. J. Insel and S. H. Friedberg, Elementary Linear Algebra, 2nd ed., Pearson. (Chapters 1-7)</p> <p>(5) L. E. Spence, A. J. Insel and S. H. Friedberg, Elementary Linear Algebra: A Matrix Approach, 2nd. ed., Pearson. (Chapters 1-7)</p> <p>(6) S. J. Leon, Linear Algebra with Application, 8th, 9th or 10th ed., Pearson. (Chapters 1-7)</p> <p>(7) H. Anton, C. Rorres and, A. Kaul, Elementary Linear Algebra, 10th, 11th or 12th ed., Wiley. (Chapters 1-9)</p> <p>(8) G. Strang, Introduction to Linear Algebra, 4th or 5th ed., Wellesley-Cambridge Press. (Chapters 1-8)</p> <p>(9) D. C. Lay, S. Lay and J. McDonald, Linear Algebra and Its Applications, 5th or 6th ed., Pearson. (Chapters 1-7)</p> <p>(10) C. H. Edwards and D. E. Penny, Elementary Differential Equations with Boundary Value Problems, 6th ed., Pearson. (Chapters 1-5, 8 and 9)</p> <p>(11) C. H. Edwards and D. E. Penney, Elementary Differential Equations with Boundary Value Problem: Computing and Modeling, 5th ed., Pearson. (Chapters 1-5 and 7-10)</p> <p>(12) P. V. O'Neil, Advanced Engineering Mathematics, 7th or 8th ed., Cengage Learning. (Chapters 1-4, 6-13 and 17)</p> <p>(13) D. G. Zill and W. S. Wright, Differential Equations with Boundary-Value Problems, 8th or 9th ed., Cengage Learning. (Chapters 1-8, 11 and 12)</p> <p>(14) R. C. DiPrima and W. E. Boyce, Elementary Differential Equations and Boundary Value Problems, 10th, 11th or 12th ed., Wiley. (Chapters 1-7, 10 and 11)</p>
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考科/代碼	電磁學 (3007)
考科綱要	<ol style="list-style-type: none"> 1. Vector analysis 2. Static electric fields 3. Solution of electrostatic problems Steady electric currents 4. Static magnetic currents 5. Time-varying fields and Maxwell's equations 6. Plane electromagnetic waves 7. Theory and applications of transmission lines 8. Waveguides and cavity resonators (excluding circular waveguides and cavities)
參考書目	A. D. Griffiths, Introduction to Electrodynamics, 4th ed., Cambridge: Cambridge

	<p>University Press, 2017.</p> <p>B. David K. Cheng, Field and Wave Electromagnetics, 2nd ed., Pearson Education Limited 1989.</p> <p>C. N.N. Rao, Element of Engineering Electromagnetics, 6th ed., New Jersey: Pearson Prentice Hall, 2004.</p>
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考科/代碼	電路學 (3009)
考科綱要	<p>(A)直流與交流電路分析</p> <p>(B)網路重要定理</p> <p>(C)交流電路功率計算</p> <p>(D)平衡三相電路分析</p> <p>(E)雙埠電路分析</p> <p>(F)富立葉級數與拉氏轉換在電路分析之應用</p> <p>(G)基礎電力電子</p>
參考書目	<p>1. Electric Circuits, 8th edition, by James W. Nilsson and Susan A. Riedel</p> <p>2. Circuit Analysis: Theory and Practice, 4th ed. by A. Robbins and W. Miller</p> <p>3. Foundations of Analog and Digital Electronic Circuits, Anant Agarwal and Jeffrey H. Lang</p> <p>4. Power Electronics: Converters, Applications, and Design, Ned Mohan, Tore M. Undeland, William P. Robbins</p>

考科/代碼	訊號與系統 (300B)
考科綱要	<p>1. Fundamental of Signals and Systems</p> <p>2. Linear Time-Invariant Systems</p> <p>3. Time and Frequency Characterization of LTI Systems</p> <p>4. Fourier Series Representation of Periodic Signals</p> <p>5. Fourier Transform</p> <p>6. Sampling and Discrete-Time Processing</p> <p>7. Laplace Transform</p> <p>8. z-Transform</p>
參考書目	無

考科/代碼	控制系統 (300D)
考科綱要	<p>1. Time-Domain Responses</p> <p>2. Root Locus</p> <p>3. Frequency-Domain Responses</p> <p>4. Controller Design</p>
參考書目	<p>1. F. Golnaraghi and B. C. Kuo, Automatic Control Systems, 10 Ed., McGraw Hill, 2017.</p> <p>2. Gene F. Franklin, J. David Powell, and Abbas Emami-Naeini, "Feedback Control of Dynamic Systems," 8 Ed., Pearson, 2019</p> <p>3. Richard. C. Dorf and Robert. H. Bishop, Modern Control Systems, 13 Ed., Pearson, 2017.</p>

考科/代碼	通訊系統(通訊原理) (300E)
考科綱要	<ol style="list-style-type: none"> 1. Signals and systems, probability and random processes 2. Analog communication (linear modulation, angle modulation, performance of analog modulation methods) 3. Digital communication (baseband and passband digital modulation, signalspace concepts, bandlimited transmission, signal reception methods,equalization, transmission performance analysis) 4. Information theory, source coding, channel coding
參考書目	<ol style="list-style-type: none"> 1. S. Haykin, Communication Systems, 4th ed., Wiley, 2001. 2. R. E. Ziemer, and W. H. Tranter, Principles of Communications System:Systems, Modulation and Noise, 7th Edition, 2015.

考科/代碼	近代物理 (300F)
考科綱要	<ol style="list-style-type: none"> 1. Special Relativity 2. Particles and Waves in Classical Physics <ul style="list-style-type: none"> . Classical Waves . X Rays 3. Quanta of Energy <ul style="list-style-type: none"> . Blackbody Radiation . Planck's Quantization of Energy . Photons and the Photoelectric Effect . The Specific Heat of Solids 4. Atomic Structure and Spectral Lines <ul style="list-style-type: none"> . The Spectral Series of Hydrogen . Rutherfords's Nuclear Atom . Bohr's theory . The Correspondence Principle 5. Quantum Mechanics I – Free Particles <ul style="list-style-type: none"> . The de Broglie Wavelength . Particle vs. Wave; Duality . Heisenberg's Uncertainty Relations; Complementarity . Schrodinger's Wave Equation for a Free Particle . Wave Packets; Group Velocity 6. Wave Mechanics II – Particles in Potentials <ul style="list-style-type: none"> . Particle in a Box . Piecewise Constant Potentials; The Finite Potential Well . Barrier Penetration . The Harmonic Oscillator . The Hydrogen Atom 7. Spin and the Exclusion Principle <ul style="list-style-type: none"> . The Spin of the Electron . The Total Angular Momentum; L-S coupling . The Zeeman Effect . Pauli's Exclusion Principle . Periodic Table 8. Statistical Physics <ul style="list-style-type: none"> . The Maxwell-Boltzmann Distribution . The Bose-Einstein Distribution

	<ul style="list-style-type: none"> . The Fermi-Dirac Distribution <p>9. Electrons in Solids</p> <ul style="list-style-type: none"> . Free Electron Gas . Band Theory of Solids; Conductors, Semiconductors, and Insulators . p-n Junction . Semiconductor Devices
參考書目	<p>A. Concepts of Modern Physics, Arthur Beiser, (2003)</p> <p>B. Physics for Scientists and Engineers with Modern Physics, Raymond A. Serway, (2004)</p> <p>C. Modern Physics, Randy Harris, (2008)</p>

考科/代碼	固態電子元件 (300G)
考科綱要	<p>Chapter 1: Electron Energy and States in Semiconductors</p> <p>1.1. Introduction and Preview</p> <p>1.2. A brief history</p> <p>1.3. Application to the Hydrogen Atom</p> <p>1.7. A First Look at Optical Emission and Absorption</p> <p>1.8. Crystal Structures, Planes, and Directions</p> <p>Chapter 2: Homogeneous Semiconductors</p> <p>2.1. Introduction and Preview</p> <p>2.3. Conduction Band Structure</p> <p>2.4. Valence Band Structure</p> <p>2.5. Intrinsic Semiconductors</p> <p>2.6. Extrinsic Semiconductors</p> <p>2.7. The Concept of Holes</p> <p>2.9. Fermi-Dirac Statistics</p> <p>Chapter 3: Current Flow in Homogeneous Semiconductors</p> <p>3.1. Introduction</p> <p>3.2. Drift Current</p> <p>3.3. Carrier Mobility</p> <p>3.4. Diffusion Current</p> <p>3.5. Carrier Generation and Recombination</p> <p>3.7. Continuity Equations</p> <p>3.8. Minority Carrier Lifetime</p> <p>3.9. Minority Carrier Diffusion Lengths</p> <p>Chapter 4: Non-Homogeneous Semiconductors</p> <p>4.1. Constancy of the Fermi Level at Equilibrium</p> <p>4.2. Graded Doping</p> <p>Chapter 5: Prototype pn Homojunctions</p> <p>5.1. Introduction</p> <p>5.2. Prototype pn Junctions</p> <p>5.3. Prototype pn Homojunctions</p>

	<p>5.4. Small-Signal Impedance of Prototype Homojunctions</p> <p>5.5. Transient Effects</p> <p>5.6. Effects of Temperature</p> <p>Chapter 6: Additional Considerations for Diodes</p> <p>6.1. Introduction</p> <p>6.2. Nonstep Homojunctions</p> <p>6.3. Metal-Semiconductor Junctions</p> <p>Chapter 7: The MOSFET</p> <p>7.1. Introduction</p> <p>7.2. MOSFETs (Qualitative)</p> <p>7.2.1 Introduction to MOS Capacitors</p> <p>7.3. MOSFETs (Quantitative)</p> <p>7.4. Comparison of Models with Experiment</p> <p>Chapter 8: Additional Considerations for FETs</p> <p>8.1. Introduction</p> <p>8.2. Measurement of Threshold Voltage and Low-Field Mobility</p> <p>8.3. Subthreshold Leakage Current</p> <p>8.8 Short-Channel Effects</p> <p>8.9 MOSFET scaling</p> <p>Chapter 9: Bipolar Junction Transistors</p> <p>9.1. Introduction</p> <p>9.2. Output Characteristics</p> <p>9.3. Current Gain</p> <p>9.5. Doping Gradients in BJTs</p> <p>9.6. The Basic Ebers-Moll DC Model</p> <p>9.7. Current Crowding and Base Resistance in BJTs</p> <p>9.8. Base Width Modulation</p>
<p>參考書目</p>	<p>(1) A. G. Streetman, Solid State Electronic Devices, 6th ed.</p> <p>(2) R. F. Pierret, Semiconductor Device Fundamentals.</p> <p>(3) B. L. Anderson & R. L. Anderson, Fundamentals of Semiconductor Devices</p> <p>(4) D. Neaman, Semiconductor Physics and Devices: Basic Principles, 4th ed.</p> <p>(5) S. M. Sze, Semiconductor Devices - Physics and Technology, 2nd ed.</p>