

# Group 2 Electives

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## ECE 304

- **Course Description:**  
MOS digital circuits, logic gates, threshold voltages. MOS logic families: design and simulation. CMOS timing: propagation delay, rise and fall times. Storage elements, memory, I/O and interfacing. Credit may be obtained in only one of ECE 304 or E E 351.
- **Prerequisites:**  
ECE 210 or E E 280 or CMPUT 329, and ECE 302 or E E 340
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
304 is a challenging course in the Electrical and Computer Engineering department, which is restricted to Computer Engineering students due to its advanced nature. Non-Computer Engineering students can enroll after June 15th.

## ECE 401

- **Course Description:**  
Introduction to power electronics. AC-DC conversion. DC-AC conversion. DC-DC conversion. AC-AC conversion. Credit may be obtained in only one of ECE 401 or E E 431.
- **Prerequisite:**  
ECE 302 or E E 340
- **Terms the course is available in:**  
Fall Term 2024

- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 402

- **Course Description:**  
Introduction to radio communications systems. Frequency selective circuits and transformers. Parallel resonant circuits including transformers. Double-tuned circuits. Impedance matching. Oscillators. Conditions for oscillation. Amplitude limitation mechanisms. Phase stability. Crystal oscillators. Mixers. Diode-ring mixers. Square-law mixers. BJT mixers. Intermodulation distortion. Modulators and demodulators. Average envelope detectors. FM demodulators. High frequency amplifiers and automatic gain control. Broadband techniques. Neutralization. Phase-lock loops. Phase detectors. Voltage-controlled oscillators. Loop filters. Phase-locked loop applications. Power amplifiers. Corequisite: ECE 360 or ECE 362 or E E 357 or E E 462. Credit may be obtained in only one of ECE 402 or E E 451.
- **Prerequisite:**  
ECE 303 or E E 350
- **Terms the course is available in:**  
No term decided yet/not offered this year
- **Instructor(s):**  
No instructor teaching the course
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 403

- **Course Description:**  
Very Large Scale Integration (VLSI) design techniques and their application. Electrical characteristics of MOSFET devices and CMOS circuits. Use of CAD tools for simulation and integrated circuit layout. Modeling delays, advanced digital logic circuit techniques, memory. Credit may be obtained in only one of ECE 403 or E E 453.
- **Prerequisite:**  
ECE 304 or E E 351; corequisite: ECE 410 or CMPE 480
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Duncan Elliott (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Duncan Elliott's Rate My Professor rating is 2.4/5
- **Course Difficulty:**  
442, being a multimedia signal processing course, is generally considered to be less difficult than ECE 403, which goes in depth about machine learning.

## ECE 410

- **Course Description:**  
Review of classical logic design methods. Introduction to the hardware description language VHDL. Logic simulation principles. Digital system design. Digital system testing and design for testability. Arithmetic circuits. State-of-the-art computer-aided design tools and FPGAs are used to design and implement logic circuits. Corequisite: ECE 304 or E E 351. Credit may be obtained in only one of CMPE 480 or ECE 410.
- **Prerequisites:**  
None
- **Terms the course is available in:**  
Fall Term 2024

- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
The course ECE 410 is challenging, with particularly difficult quizzes that include negative marking.

## ECE 432

- **Course Description:**  
Introduction to variable speed drives. Frequency, phase and vector control of induction motors. Dynamic models for induction motors. Permanent magnet synchronous and brushless dc motor drives. Credit may be obtained in only one of ECE 432 or E E 432.
- **Prerequisite:**  
ECE 332 or E E 332
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Hao Liang (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Hao Liang's Rate My Professor rating is 4.9/5
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 433

- **Course Description:**  
Introduction to power system transient states. Power system voltage stability; PV and QV curve methods. Power system angular stability; transient stability and equal area criterion; steady-state stability and power system stabilizer. Electromagnetic transients in power systems, insulation coordination and equipment protection. Methods of power

system design and simulation. Credit may be obtained in only one of ECE 433 or E E 433.

- **Prerequisites:**  
ECE 330 or E E 330, and ECE 332 or E E 332
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Gregory Kish (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Gregory Kish's Rate My Professor rating is 3.1/5
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 440

- **Course Description:**  
Extension of sampling theory and the Fourier transform to two dimensions, pixel operations including gray-level modification, algebraic and geometric transformations. The design of spatial filters for noise reduction, image sharpening and edge enhancement, and some discussion of interpolation techniques. An introduction to the concepts of image restoration from known degradations and the reconstruction of images from parallel and fan projections. Credit may be obtained in only one of EE BE 540 or ECE 440.
- **Prerequisite:**  
ECE 340 or E E 338 or consent of Instructor
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all

- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 442

- **Course Description:**  
Human visual/audio perception and multimedia data representations. Basic multimedia processing concepts, multimedia compression and communications. Machine learning tools for multimedia signal processing, including principle component analysis and Gaussian mixture modeling. Applications to human-computer interaction, visual-audio, and visual-text processing. Credit may be obtained in only one of ECE 442 or E E 442.
- **Prerequisites:**  
ECE 220 or CMPUT 275, ECE 342, MATH 102 or equivalent knowledge
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Li Cheng (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Li Cheng's Rate My Professor rating is 2.5/5
- **Course Difficulty:**  
442 can be considered to have varying levels of difficulty depending on the specific focus within the field of machine learning. While some may find it to be the most fun and interesting elective due to its in-depth exploration of the subject, others may perceive it as the easiest elective on the list due to its focus on multimedia signal processing.

## ECE 449

- **Course Description:**  
Intelligent systems for automatic control and data analysis. The concepts of vagueness and uncertainty, approximate reasoning, fuzzy rule-based systems and fuzzy control. Strategies for learning and adaptation, supervised and reinforcement learning, self-organization and the selection of neural network architectures. Discussion of the principles of search and optimization, evolution and natural selection and genetic algorithms. Introduction to hybrid intelligence. Applications of intelligent systems for

pattern recognition, classification, forecasting, decision support, and control. Credit may be obtained in only one of CMPE 449 or ECE 449.

- **Prerequisites:**  
None
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
ECE 449 is likely to consist mainly of programming labs, so the lab kit may not be required. However, for capstone projects, some components might be needed, so it's recommended to keep them on hand. The lab facilities should provide most, if not all, necessary equipment. The difficulty level of the course is moderate to high, due to the complex programming assignments and the need for a solid understanding of electrical engineering concepts.

## ECE 450

- **Course Description:**  
Semiconductor device physics, device scaling trends, advanced MOSFET fabrication and the associated quantum mechanical framework in nanoscale systems. Semiconductor devices as a system of elemental components. Quantum phenomena in the evaluation of semiconductor devices. Impact of new materials such as high-k gate dielectrics, copper damascene processing and diffusion barriers on device performance. Choice of channel materials and strain condition for ultrascaled logic devices, RF and power electronic devices. Credit may be obtained in only one of ECE 450 or E E 450.
- **Prerequisite:**  
ECE 302 or E E 340
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Manisha Gupta (teaching in Winter Term 2024), Instructor(s) undecided for Winter

Term 2025

- **Instructor ratings:**  
Manisha Gupta's Rate My Professor rating is 1.9/5
- **Course Difficulty:**  
Based on the information provided, it appears that ECE 450 is a challenging engineering course, as indicated by the fact that there is an old syllabus available online, suggesting that the course has been offered multiple times and likely requires a significant amount of effort and dedication to complete.

## ECE 457

- **Course Description:**  
Microfabrication processes for CMOS, bipolar, MEMS, and microfluidics devices. Laboratory safety. Deposition processes of oxidation, evaporation and sputtering. Lithography, wet and dry etch, and device characterization. Note: Consent of Department required. Credit may be obtained in only one of ECE 457 or E E 457.
- **Prerequisites:**  
None
- **Terms the course is available in:**  
Fall Term 2024, Winter Term 2025
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024, Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 460

- **Course Description:**  
Introduction to computer control, sample and hold, discrete-time systems. States and state space models. Linearization of nonlinear state-space models. Solving linear time-



invariant state-space equations. Discretization of continuous-time systems. Controllability and observability, and their algebraic tests. Minimal state-space realizations. State feedback and eigenvalue/pole assignment, deadbeat control. Step tracking control design. State estimation and observer design. Observer based control. Introduction to linear quadratic optimal control. Credit may be obtained in only one of ECE 460 or E E 460.

- **Prerequisites:**  
ECE 360 or E E 357, and ECE 340
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Qing Zhao (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Qing Zhao's Rate My Professor rating is 3.8/5
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 464

- **Course Description:**  
Basic concepts of computer-integrated intervention. Surgical CAD/CAM, assist and simulation systems. Actuators and imagers. Medical robot design, control and optimization. Surgeon-robot interface technology. Haptic feedback in surgical simulation and teleoperation. Virtual fixtures. Time delay compensation in telesurgery. Cooperative manipulation control. Overview of existing systems for robot-assisted intervention and for virtual-reality surgical simulation. Credit may be obtained in only one of ECE 464 or E E 464.
- **Prerequisite:**  
ECE 360 or ECE 462 or E E 357 or E E 462 or consent of the Department
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Mahdi Tavakoli Afshari (teaching in Winter Term 2024), Instructor(s) undecided for

Winter Term 2025

- **Instructor ratings:**  
The professor does not have a rating on Rate My Professor
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 471

- **Course Description:**  
Electromagnetic wave propagation at optical frequencies and approximations. Thermal and luminescent light sources, optical beams. Ray and Gaussian optics and simple optical components. Wave optics, polarization, interference, interferometric devices. Light-matter interactions. Optics of crystals; polarizers and waveplates. Photodetectors. Photonic engineering applications. Corequisite: ECE 370 or E E 315, or PHYS 381. Note: Only one of the following courses may be taken for credit: ECE 471, E E 471 or PHYS 362.
- **Prerequisites:**  
None
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 476

- **Course Description:**  
Electrostatics and magnetostatics; Maxwell's equations and plane waves. Analysis and characterization of waveguides, rectangular and circular waveguides, waveguide cavities. Radiation mechanism of dipoles, fundamental parameters, Friis transmission

equations, link budget analysis, linear wire antennas, antenna arrays, different types of antennas, antenna measurements. Credit may be obtained in only one of ECE 476 or E E 476.

- **Prerequisites:**  
ECE 370 or E E 315 or PHYS 381
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 478

- **Course Description:**  
Introduction to RF/microwave circuits and their applications. Maxwell's Equations and basic wave-propagation concepts. Transmission-line theory and impedance-matching techniques. Practical planar transmission lines. Lumped and distributed microwave-circuit elements. Microwave network analysis using impedance/admittance parameters, scattering parameters, and transmission-matrix methods. Analysis, design, fabrication, and test of practical RF/microwave devices including power dividers/combiners, couplers, amplifiers, and filters. Credit may be obtained in only one of ECE 478 or E E 478.
- **Prerequisites:**  
ECE 370 or E E 315 or PHYS 381
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024

- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
478, also known as Microwaves, is considered the most challenging undergraduate EE course at the university. Despite its difficulty, students who have taken it often find it to be a rewarding experience. The course is well-organized and fair, providing students with all the necessary resources to understand the material.

## ECE 485

- **Course Description:**  
Principles of digital communications; signal space concepts, digital modulation and demodulation, intersymbol interference, and pulse shaping. Design of optimal receivers; performance in the presence of channel noise. Introduction to source coding and channel coding. Credit may be obtained in only one of ECE 485 or E E 485.
- **Prerequisites:**  
ECE 342 or E E 387, and ECE 380 or E E 390
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
The comments suggest that the lab component of ECE 485 may not require students to bring their own lab kits, as the necessary equipment is provided in the lab room. However, some components may still be needed for capstone projects. The overall difficulty of the course is not explicitly stated, but it can be inferred that it involves lab work and potentially some component procurement for capstone projects.

## BME 513

- **Course Description:**  
Introduction to basic physical and technological aspects of medical imaging. Emphasis

on computed transmission and emission tomography, magnetic resonance, and ultrasound imaging. These methods are developed and contrasted in terms of how imaging information is generated, detected, and processed and how different hardware configurations and other factors limit image quality. Relative diagnostic potential of the imaging methods is also discussed in relation to future prospects of each method.

- **Prerequisites:**  
None
- **Terms the course is available in:**  
Winter Term 2024
- **Instructor(s):**  
Robert Stobbe (teaching in Winter Term 2024), Alan Wilman (teaching in Winter Term 2024)
- **Instructor ratings:**  
The professor does not have a rating on Rate My ProfessorThe professor does not have a rating on Rate My Professor
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 405

- **Course Description:**  
Introduction to the principles of biophysical instrumentation. Various sensors are examined including strain gauges, inductive, capacitive, thermal, and piezoelectric sensors. Methods of measuring blood pressure are discussed. Origin of biopotentials; membrane and action potentials. Measurement of bioelectrical signals such as the ECG and EMG. Electrical safety, noise, impedance matching, and analog-to-digital conversion. Applications of electrodes, biochemical sensors, and lasers. Credit may be obtained in only one of ECE 405 or EE BE 512.
- **Prerequisite:**  
ECE 203 or E E 250 or consent of the Instructor
- **Terms the course is available in:**  
Fall Term 2024

- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
ECE 405, Biophysical Instrumentation and Measurement, is a course that has very few students enrolled, with an average of 50 students per semester for over a dozen years. The course is known to have a lot of calculations and theoretical questions on assignments and exams, but is considered to be fairly straightforward. The midterm exams are known to be time-consuming, and the course was previously taught by Zemp.

## ECE 408

- **Course Description:**  
Intended to enable individuals or a small group of students to study topics in their particular field of interest under the supervision of a member of the Department of Electrical and Computer Engineering or other appropriate departments.
- **Prerequisites:**  
None
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
The course ECE 408 appears to be a research-oriented course, where students with a shared interest in a particular topic can form a group and propose a project to the department. The department may approve the project and assign a professor to supervise the group. The nature of the course suggests that it may not have a standardized grading system, as the focus is on research and individual progress. The availability of this course seems to be limited due to staff shortages and budget cuts. The difficulty of this course would likely depend on the complexity of the research project and the student's ability to execute it.

## ECE 409

- **Course Description:**  
Intended to enable individuals or a small group of students to study topics in their particular field of interest under the supervision of a member of the Department of Electrical and Computer Engineering or other appropriate departments.
- **Prerequisites:**  
None
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Instructor(s) undecided for Winter Term 2024, Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 412

- **Course Description:**  
Defects in manufacturing, failure mechanisms, and fault modeling. Reliability and availability theory. Static and dynamic redundancy and repair. Error correcting codes and self-checking systems. Roll-back strategies. Fault-tolerant computers and network architecture. Credit may be obtained in only one of CMPE 425 or ECE 412.
- **Prerequisite:**  
ECE 342
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Jie Han (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025

- **Instructor ratings:**  
Jie Han's Rate My Professor rating is 3.4/5
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 452

- **Course Description:**  
Introduction to advanced numerical methods such as finite-difference, finite-element and spectral-domain techniques for solving partial differential equations. Simulations of nanoscale systems involving multiphysics or coupled differential equations involving electron and thermal transport phenomena, electrodynamics, MEMS, and process simulation, graphical methods for 3D visualization of simulation data. Examples from applied areas of nanoengineering to demonstrate computational methods for understanding complex physical phenomena and for designing and simulating nanoscale devices and systems. Credit may be obtained in only one of ECE 452 or ECE 445.
- **Prerequisites:**  
ECE 341 or MATH 309 or 311
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 487

- **Course Description:**  
Network topologies. Layered architectures and the Open Systems Interconnection (OSI) reference model. Peer-to-peer protocols, medium access control protocols, and local area network standards. Packet switched networks and routing, the TCP/IP suite of



protocols. Credit may be obtained in only one of ECE 487, CMPUT 313 or CMPE 487.

- **Prerequisites:**  
None
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Hai Jiang (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Hai Jiang's Rate My Professor rating is 4.7/5
- **Course Difficulty:**  
The final exam in ECE 487 contained some challenging questions that were not covered in the lectures. The presence of a question asking for a student ID suggests that the exam may have included some unconventional or open-ended problems. Overall, the course appears to be quite demanding.

## ECE 341

- **Course Description:**  
Introduction to analytical solutions of partial differential equations, eigenfunctions and eigenvalue problems, special functions in cylindrical and spherical coordinates, Green's functions, and transform methods. These concepts provide the necessary mathematical foundation for understanding and analyzing important physical phenomena encountered at the micro and nanoscales. Examples drawn from electromagnetics, quantum mechanics, solidstate physics, photonics, thermal transport, and microelectromechanical systems. Credit may be obtained in only one of ECE 341 or E E 323.
- **Prerequisites:**  
ECE 240 or E E 238, and MATH 309 or 311
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Alan Lynch (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term

2025

- **Instructor ratings:**

Alan Lynch's Rate My Professor rating is 3.9/5

- **Course Difficulty:**

ECE 341 is a challenging course, with the material being heavily rooted in mathematics. The assignments are reportedly difficult and may require significant assistance from the professor. The professor, Dr. Alan Lynch, is described as being helpful and lenient in grading, but the assignments are still a struggle for some students. It is noted that students cannot take both ECE 341 and MATH 300 for credit, so students who cannot take ECE 341 may opt to take another math course instead.

## ECE 430

- **Course Description:**

Transmission line design parameters; power flow computations; Generator control systems, load frequency control; economic operation of power systems; Symmetrical components theory; Symmetrical and unsymmetrical fault analysis. Corequisite: ECE 332 or E E 332. Credit may be obtained in only one of ECE 430 or E E 430.

- **Prerequisite:**

ECE 330 or E E 330

- **Terms the course is available in:**

Fall Term 2024

- **Instructor(s):**

Instructor(s) undecided for Fall Term 2024

- **Instructor ratings:**

No professors teaching this term, so no ratings available at all

- **Course Difficulty:**

The course ECE 430 appears to be challenging, as indicated by the fact that the final average was 78% and a 95%+ was required for an A+. Additionally, there were only 15 students in the class, suggesting that the grading may have been competitive and curved. The comment "oof" suggests disappointment or frustration, possibly due to the perceived difficulty of the course.

## ECE 434

- **Course Description:**  
Short-circuit and other faults in power systems. Analysis of faulted power systems in phase domain, components of power system protection, various protection schemes and relays. Power system grounding, concepts of transient overvoltage and ground potential rise. Credit may be obtained in only one of ECE 434 or E E 434.
- **Prerequisite:**  
ECE 430
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Wilsun Xu (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Wilsun Xu's Rate My Professor rating is 2.3/5
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 447

- **Course Description:**  
The course introduces basic concepts and techniques of data analysis and machine learning. Topics include: data preprocessing techniques, decision trees, nearest neighbor algorithms, linear and logistic regressions, clustering, dimensionality reduction, model evaluation, deployment methods, and emerging topics.
- **Prerequisites:**  
ECE 220 or CMPUT 275, and ECE 342 or STAT 235, or consent of instructor
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Marek Reformat (teaching in Winter Term 2024), Instructor(s) undecided for Winter

Term 2025

- **Instructor ratings:**

Marek Reformat's Rate My Professor rating is 4.7/5

- **Course Difficulty:**

The course ECE 447 is a new introduction to machine learning, and while it is disorganized, the professor is great and the assessments are considered easy. The course content is said to provide a basic introduction to machine learning and some hands-on experience with data analysis. The programming aspect of the course is not considered too difficult, especially for those with a background in software. Overall, the course is considered fairly easy.

## ECE 456

- **Course Description:**

Fundamental concepts related to current flow in nanoelectronic devices. Energy level diagram and the Fermi function. Single-energy-level model for current flow and associated effects, such as the quantum of conductance, Coulomb blockade, and single electron charging. The Schroedinger equation and quantum mechanics for applications in nanoelectronics. Matrix-equation approach for numerical band structure calculations of transistor channel materials. k-space, Brillouin zones, and density of states. Subbands for quantum wells, wires, dots, and carbon nanotubes. Current flow in nanowires and ballistic nanotransistors, including minimum possible channel resistance, quantum capacitance, and the transistor equivalent circuit under ballistic operation. Credit may be obtained in only one of ECE 456 or E E 456.

- **Prerequisite:**

ECE 302 or E E 340

- **Terms the course is available in:**

Winter Term 2024, Winter Term 2025

- **Instructor(s):**

Mani Vaidyanathan (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025

- **Instructor ratings:**

Mani Vaidyanathan's Rate My Professor rating is 5/5

- **Course Difficulty:**

The course ECE 456 in the Faculty of Engineering does not have clear deadlines stated

in the syllabus, causing confusion among students. Some students have received conflicting information about a deadline from their professor, with one stating that it is on March 11 in the evening. The lack of clarity in the syllabus may contribute to increased stress and difficulty for students in managing their workload and meeting deadlines.

## ECE 458

- **Course Description:**

Overview of microelectromechanical (MEMS) systems, applications of MEMS technology to radio frequency, optical and biomedical devices. Basic MEMS building blocks, cantilever and clamped-clamped beams. Actuation mechanisms of mechanical microdevices, thermal and electrostatic. The thin film fabrication process, deposition, lithography, etching and release. MEMS in circuits, switches, capacitors, and resonators. Credit may be obtained in only one of ECE 458 or E E 458.

- **Prerequisites:**

ECE 370 or E E 315 or PHYS 381, and one of MAT E 201, PHYS 244, MEC E 250

- **Terms the course is available in:**

Fall Term 2024

- **Instructor(s):**

Instructor(s) undecided for Fall Term 2024

- **Instructor ratings:**

No professors teaching this term, so no ratings available at all

- **Course Difficulty:**

Insufficient information available on course difficulty

## ECE 472

- **Course Description:**

Interaction of radiation with atoms, laser oscillations and threshold conditions, 3- and 4-level laser systems, rate equations, special properties of laser light, cavity Q and photon lifetime, optical resonators and lens waveguides, Gaussian beams, gain saturation, Q-switching, mode locking, interaction of light and sound, holography. Description of various lasers: solid, gas, semiconductor, dye, Raman and chemical. Laser applications. Credit may be obtained in only one of ECE 472 or E E 472.

- **Prerequisites:**  
ECE 370 or E E 315 or PHYS 381 or consent of Instructor
- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Jason Myatt (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Jason Myatt's Rate My Professor rating is 4.3/5
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 474

- **Course Description:**  
Definition of plasma. Behavior in electric and magnetic fields. Particle, kinetic and fluid description of flow and transport phenomena. Waves in plasmas. Current approaches to thermonuclear fusion. High temperature laser produced plasmas and low temperature DC and RF discharge plasmas. Applications in discharge pumping of lasers, plasma etching, thin film deposition and generation of x-rays. Credit may be obtained in only one of ECE 474 or E E 474.
- **Prerequisites:**  
ECE 370 or E E 315 or PHYS 381
- **Terms the course is available in:**  
Fall Term 2024
- **Instructor(s):**  
Instructor(s) undecided for Fall Term 2024
- **Instructor ratings:**  
No professors teaching this term, so no ratings available at all
- **Course Difficulty:**  
Insufficient information available on course difficulty

## ECE 475

- **Course Description:**

Basic optical properties of crystalline and amorphous semiconductor materials: energy band diagrams, optical constants. Recombination and light emission in semiconductors. Light emitting diodes: spectral characteristics, materials, and applications. Stimulated emission and laser oscillation conditions in semiconductors. Laser diodes: modal and spectral properties, steady state rate equations, materials and structures. Light absorption, optical to electrical energy conversion. Photovoltaic cells: fill factors and efficiency, temperature effects, alternative materials and structures. Credit may be obtained in only one of ECE 475 or E E 475.

- **Prerequisite:**

ECE 302 or E E 340

- **Terms the course is available in:**

Winter Term 2024, Winter Term 2025

- **Instructor(s):**

Amina Hussein (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025

- **Instructor ratings:**

Amina Hussein's Rate My Professor rating is 4.5/5

- **Course Difficulty:**

Insufficient information available on course difficulty

## ECE 486

- **Course Description:**

Characteristics of wireless channels; path loss, shadow fading and multipath propagation. Challenges in wireless system design, digital modulation techniques for wireless communications, transmitter and receiver design for fading channels. Fundamentals of cellular system design and multiple access techniques. Credit may be obtained in only one of ECE 486 or E E 486.

- **Prerequisites:**

ECE 342 or E E 387, and ECE 380 or E E 390

- **Terms the course is available in:**  
Winter Term 2024, Winter Term 2025
- **Instructor(s):**  
Yindi Jing (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
- **Instructor ratings:**  
Yindi Jing's Rate My Professor rating is 3.6/5
- **Course Difficulty:**  
Insufficient information available on course difficulty