Group 2 Electives

# CMPUT 250

* **Course Description:**  
  An interdisciplinary course for students in Science, Arts, and other faculties. The focus is on games as interactive entertainment, their role in society, and how they are made. Teams composed of students with diverse backgrounds (e.g. English, Art and Design, and Computing Science) follow the entire creative process: from concept, through pitch, to delivery, of a short narrative-based game using a commercial game engine. To achieve the required mix of backgrounds and experience, students must apply to be considered for this course. See the Department web site for the online form.
* **Prerequisite:** Second-year standing
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024, Winter Term 2025
* **Instructor(s):**Matthew Guzdial (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024, Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**Matthew Guzdial's Rate My Professor rating is 4.9/5
* **Course Difficulty:** The course CMPUT 250 is known to have a significant workload, with students reporting that it took up most of their time alongside other courses. The course includes midterms, finals, labs, and a group project. Tests and labs are reported to be relatively easy, but the group project's success depends on the quality of the group. The average grade for the course is reported to be around 3.9, indicating that a strong work ethic can lead to high marks. Admission to the course may be competitive, as some students report being on the waiting list.

# CMPUT 304

* **Course Description:**  
  The second course of a two-course sequence on algorithm design. Emphasis on principles of algorithm design. Categories of algorithms such as divide-and-conquer, greedy algorithms, dynamic programming; analysis of algorithms; limits of algorithm design; NP-completeness; heuristic algorithms.
* **Prerequisites:** CMPUT 204; one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181; and one of MATH 225, 227, or 228
* **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 CMPUT 304 is reported to be difficult by several students, with some expressing frustration over the teaching style of the professor. They suggest that the course material can be self-taught through resources like YouTube and StackOverflow, and that the professor's lectures may not provide a thorough understanding of the concepts. However, others note that the course itself is relatively low maintenance and that the homework and quizzes are straightforward. It is recommended that students have a strong foundation in the prerequisite course CMPUT 204 before taking 304. Overall, the course is described as challenging, particularly for those who struggle with abstracted math concepts.

# CMPUT 307

* **Course Description:**  
  An introductory course on the theory and applications of computer based 3D modeling and animation. The course will cover a selection of topics from overview of tools supporting modeling and animation, automatically generating 3D models, and animation of skeleton based models through algorithms and software. Applications of 3D modeling and animation in games, virtual/augmented environments, movies, and emerging video transmission algorithms will be discussed.
* **Prerequisites:** one of CMPUT 206, 308, or 411; or consent of the instructor
* **Terms the course is available in:**Winter Term 2024
* **Instructor(s):**Anup Basu (teaching in Winter Term 2024),
* **Instructor ratings:**Anup Basu's Rate My Professor rating is 4.3/5
* **Course Difficulty:**307 is considered a challenging course, with a strong emphasis on 3D math and linear algebra. Prerequisites include one of CMPUT 206, 308, or 411, and it may be possible to waive the prerequisite with instructor consent. Students have reported that having a solid understanding of 3D math concepts is beneficial. The textbook for the course, 366, has been criticized for its completeness and the assignments have been described as poorly worded and under-specified. Exam performance is said to heavily rely on memorizing formulas from the formula sheet. Some students have suggested that 403, which focuses on algorithmic concepts, could be a good alternative.

# CMPUT 325

* **Course Description:**  
  A study of the theory, run-time structure, and implementation of selected non-procedural programming languages. Languages will be selected from the domains of functional, and logic-based languages.
* **Prerequisites:** CMPUT 201 and 204 or 275; one of CMPUT 229, E E 380 or ECE 212, and MATH 125
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Jia-Huai You (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:** The comments suggest that there have been instances of extreme stress and anxiety in the context of CMPUT 325 exams. This indicates that the course may be particularly challenging and pressure-filled.

# CMPUT 350

* **Course Description:**  
  This course focuses on state-of-the-art AI and graphics programming for video games. Part 1 introduces C++, the language of choice for video game engines, emphasizing efficiency, safety, the Standard Template Library, and OpenGL. Part 2 on real time strategy deals with efficient pathfinding algorithms, planning, and scripting AI systems. Student projects give hands-on experience directly applicable to the video games industry.
* **Prerequisites:** CMPUT 201 or 275, and 204
* **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 CMPUT 350 is known to be quite challenging and intensive, with a heavy workload involving assignments, readings, labs, projects, quizzes, and a final exam. It covers advanced topics in C++ programming and gaming algorithms, and is considered a requirement for those aiming to break into the competitive video games industry. Prerequisites for the course include CMPUT 201, and some suggest additional courses such as CMPUT 204 for a better foundation in coding and algorithms. The labs are reportedly difficult and time-consuming, and students have shared experiences of struggling with the material. It is recommended to stay on top of the coursework, practice consistently, and seek help from TAs when needed. Some students have also suggested taking complementary courses like CMPUT 301 for a better understanding of object-oriented programming and software engineering principles.

# CMPUT 366

* **Course Description:**  
  This course provides an introduction to search and planning in artificial intelligence. The course covers deterministic single-agent and multi-agent problems. Students will learn how to model real-world problems as state-space search problems and how to solve such problems. The course covers algorithms for solving deterministic shortest path problems with factored and non-factored states, combinatorial optimization problems, constraint satisfaction problems, and multi- agent problems.
* **Prerequisites:** CMPUT 204 or 275, and CMPUT 272
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024
* **Instructor(s):**Levi Santana de Lelis (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:** The comments suggest that CMPUT 366 is generally considered to be a relatively easier course, especially in the beginning. However, the neural network material in the latter part of the course is reported to be more challenging. Some students have had positive experiences with the course, praising the foundation it provides for understanding AI concepts and applications. Others have expressed doubts about its relevance to industry, suggesting that it may not be as useful for those not pursuing advanced degrees. The comments also mention that the course material was considered fair and that the final exam was manageable with proper preparation.

# CMPUT 391

* **Course Description:**  
  This course covers the implementation of RDBMSs and some non- relational data models, along with their query languages. Topics: compilation, execution, and optimization of SQL queries; concurrent execution of transactions; indexing; advanced constructs in SQL; semi-structured data models and query languages; distributed and parallel databases; NoSQL and cloud-based database systems.
* **Prerequisites:** CMPUT 201 and 204, or 275; and CMPUT 291
* **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:** The comments suggest that the course CMPUT 391 can be quite difficult, with some students expressing concerns about the final exam and the overall course structure. Some students have had positive experiences with the course, particularly with certain professors, but others have found it to be a waste of time or even useless. The course is known to focus on the hardware of databases and database algorithms, and some students suggest that it may be better to learn these concepts on one's own rather than taking the course. The comments also mention that the assignments can be time-consuming and require a good understanding of C programming. Overall, it seems that the course may be challenging for some students, particularly those who are not interested in databases or who are not comfortable with C programming.

# CMPUT 411

* **Course Description:**  
  2D and 3D transformation; 3D modeling and viewing; illumination models and shading methods; texture mapping; ray tracing.
* **Prerequisites:** CMPUT 204 or 275, 301; one of CMPUT 340, 418 or equivalent knowledge, and MATH 214
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Pierre Boulanger (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**Pierre Boulanger's Rate My Professor rating is 2.8/5
* **Course Difficulty:**Insufficient information available on course difficulty

# CMPUT 415

* **Course Description:**  
  Compilers, interpreters, lexical analysis, syntax analysis, syntax- directed translation, symbol tables, type checking, flow analysis, code generation, code optimization.
* **Prerequisites:** one of CMPUT 229, E E 380, or ECE 212, and any 300-level Computing Science course
* **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:**415 is a challenging course with a significant workload, attracting high achievers and those with an interest in compilers. The course material is now in C++ and includes 4 projects, each increasing in scale and sophistication. The first 2 projects are individual, the 3rd is in pairs, and the 4th is in groups of 4. The course covers a lot of material and requires a decent amount of studying for tests. The final project involves implementing a LLVM based compiler for a defunct IBM language, which is a full blown language. Preparation includes knowledge of Java and familiarity with Antlr and LLVM. The workload never lets up and students are encouraged to start working on the next assignment as soon as the previous one is completed. The course is worth taking due to the large project scope and the amount of learning that takes place. The professor is an excellent teacher.

# CMPUT 466

* **Course Description:**  
  Learning is essential for many real-world tasks, including recognition, diagnosis, forecasting and data-mining. This course covers a variety of learning scenarios (supervised, unsupervised and partially supervised), as well as foundational methods for regression, classification, dimensionality reduction and modeling. Techniques such as kernels, optimization and probabilistic graphical models will typically be introduced. It will also provide the formal foundations for understanding when learning is possible and practical. Credit cannot be obtained for both CMPUT 367 and CMPUT 466.
* **Prerequisites:** CMPUT 204 or 275; MATH 125; CMPUT 267 or MATH 214; or consent of the instructor
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024
* **Instructor(s):**Bailey Kacsmar (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:** The course CMPUT 466 is known to have a significant amount of calculus and statistics, making it a challenging course for those who dislike or struggle with these subjects. It is recommended for those interested in machine learning to take additional courses such as STAT 265, 266, 371, and 372, but these may not be suitable for those who dislike math. Alternatively, there are machine learning courses with fewer math requirements, such as CMPUT 267, and online courses on platforms like Coursera. The course includes assignments, exams, a final project, and weekly thought questions. The final project is considered easy and enjoyable, while the assignments can be challenging for some students. The exams are open-ended and require clear communication of machine learning concepts. The prerequisites for CMPUT 466 include STAT 252 and linear algebra, and it is not the introductory course. The course is taught by Martha, and the TAs are reported to be helpful. The course primarily uses Python for programming.

# ECE 303

* **Course Description:**  
  Differential amplifiers. Frequency response: active device high-frequency behaviour and circuit models; amplifier circuits and design. Feedback: concepts and structure; feedback topologies and amplifiers; open- and closed-loop response. Operational amplifiers: behaviour, circuit analysis and design. Requires payment of additional student instructional support fees. Refer to the Tuition and Fees page in the University Regulations section of the Calendar. Credit may be obtained in only one of ECE 303 or E E 350.
* **Prerequisite:** ECE 302 or E E 340
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024, Winter Term 2025
* **Instructor(s):**Zhenyu Zhang (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024, Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**Zhenyu Zhang's Rate My Professor rating is 4.3/5
* **Course Difficulty:** ECE 303 appears to be a challenging course, with the instructor allowing for a passing grade of a C but still facing significant difficulties. The course content includes the use of "Basic Matrix Algebra and Transistor Circuits," but the instructor is reportedly making up a significant portion of the material as they go.

# ECE 321

* **Course Description:**  
  Software quality attributes. Software requirements. Requirements elicitation via interviewing, workshops, prototyping, and use case analysis. Vision document and Software Requirement Specification document standards. Formal software specification methods including operational and descriptive models. Design by contract. Verification and validation of requirements. Credit may be obtained in only one of CMPE 310 or ECE 321.
* **Prerequisite:** CMPUT 275
* **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 321, as described, appears to have a moderate level of difficulty. The instructor emphasizes understanding the material over memorization, and the course includes both theoretical and design components. Students work on a single project throughout the semester, which involves creating various documents and diagrams.

# ECE 360

* **Course Description:**  
  Linear system models. Time response and stability. Block diagrams and signal flow graphs. Feedback control system characteristics. Dynamic compensation. Root locus analysis and design. Frequency response analysis and design. Credit may be obtained in only one of ECE 360, ECE 362, E E 357, E E 462 or E E 469.
* **Prerequisites:** ECE 203 or E E 250, and ECE 240 or E E 238
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024, Winter Term 2025
* **Instructor(s):**Tongwen Chen (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024, Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**Tongwen Chen's Rate My Professor rating is 2.8/5
* **Course Difficulty:**442, the course on multimedia signal processing, is generally considered to be the easiest elective on the ECE list. The course delves into the intricacies of machine learning, making it an enjoyable and interesting learning experience for many students. However, if you encounter any difficulties, it would be beneficial to seek assistance from the ECE labs discord or create a discussion on e-class. The confusion could pertain to either the lecture content or the project itself.

# ECE 380

* **Course Description:**  
  Basics of analog communication: amplitude, angle, and analog pulse modulation; modulators and demodulators; frequency multiplexing. Basics of digital communication: sampling, quantization, pulse code modulation, time division multiplexing, binary signal formats. Credit may be obtained in only one of ECE 380 or E E 390.
* **Prerequisite:** ECE 240 or E E 238
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024, Winter Term 2025
* **Instructor(s):**Xingyu Li (teaching in Winter Term 2024), Instructor(s) undecided for Fall 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 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 easier than ECE 403, which goes in depth about machine learning.

# 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:** The course ECE 405 has very few students enrolled, with an average of less than one student per semester for over a decade. Despite this, the course is still being offered. The students currently taking the course are the first to do so since 2011, and they are finding that the midterms in the past have been time-pressing. Therefore, the course is likely to be quite challenging.

# ECE 406

* **Course Description:**  
  This course is 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 the Department of Computing Science 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:**Insufficient information available on course difficulty

# ECE 407

* **Course Description:**  
  This course is 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 the Department of Computing Science 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 421

* **Course Description:**  
  Advanced programming concepts. Programming language as a vehicle for discussion about programming concepts such as productivity, components and re-use, traditional vs. scripting approaches. Object oriented construction, systems programming, concurrent programming, Graphical User Interface (GUI) programming, distributed programming, and dynamic programming. Credit may be obtained in only one of CMPE 410 or ECE 421.
* **Prerequisites:** ECE 322 or CMPE 320, ECE 325, CMPUT 301 and CMPUT 379
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Ronald Unrau (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 423

* **Course Description:**  
  Topics include distributed communication models (e.g., sockets, remote procedure calls, distributed shared memory), distributed synchronization (clock synchronization, logical clocks, distributed mutex), distributed file systems, replication, consistency models, fault tolerance, QoS and performance, scheduling, concurrency, agreement and commitment, Paxos-based consensus, MapReduce and NoSQL datastores, cloud infrastructures and microservices.
* **Prerequisites:** CMPUT 379 and (ECE 487 or CMPUT 313)
* **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 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 one's background and interests. Some students may find it to be the most fun and interesting elective due to its focus on machine learning, while others may find it to be the easiest elective on the list due to its nature as multimedia signal processing.

# 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 one, and its difficulty is not yet clear. However, some students report that it is disorganized but the professor is great and assessments are easy. The course covers basic introduction to machine learning and data analysis with some hands-on experience. The programming aspect is not too challenging for those with software background. Overall, the course is considered fairly easy.

# 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:**Insufficient information available on course difficulty

# 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 provided context, it appears that the commenter is sharing a link to a syllabus for a Mechanical Engineering course. While the specific course mentioned in the post is not ECE 450, it is possible to infer some information about the difficulty of ECE 450 based on the context.  
   The fact that the commenter is sharing a syllabus for a Mechanical Engineering course suggests that they may be involved in or have some knowledge of engineering courses in general. Additionally, the use of the term "old syllabus" implies that the commenter may have some familiarity with the course content and structure of engineering courses.  
   Based on this context, it can be inferred that ECE 450 is likely to be a challenging course, given that it is an Electrical and Computer Engineering course and engineering courses in general are known for their rigor and complexity. However, without more specific information about the content and structure of ECE 450, it is impossible to provide a definitive assessment of its difficulty.

# ECE 455

* **Course Description:**  
  Microfluidic and nanobiotechnological devices. Fabrication techniques for devices: self-assembly, lithographic technologies. Applications of nanobiotechnology in computing, electronics, human health, environment and manufacture. Credit may be obtained in only one of ECE 455 or E E 455.
* **Prerequisites:** MATH 201 or PHYS 230
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Xihua Wang (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**Xihua Wang's Rate My Professor rating is 4.5/5
* **Course Difficulty:** Based on the comments, ECE 455 is considered to be a challenging course. Some students have reportedly had difficulty with it and have considered dropping it or seeking help from advisors. One student described it as an "absolute ass." However, there are also some students who have had positive experiences with other courses, such as ECE 442, which is reportedly more enjoyable and easier.

# 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 clearly state the deadline for a particular assignment in the syllabus, but according to a comment from a student, the professor mentioned it would be due on March 11, in the evening. The difficulty of the course is not directly related to this issue, but it may cause confusion and stress for students if important deadlines are not clearly communicated.

# 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