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 for having a significant workload, with students reporting spending a considerable amount of time on midterms, finals, labs, and a group project. The tests and labs are described as relatively easy, but the group project's success depends on the quality of the team. The average grade for the course is reportedly high, around 3.9, indicating that those who put in the effort can expect good grades. Additionally, getting into the class may involve a selective admission process. Students in the course, including those from outside the computer science field, report finding the music component to be time-consuming, but manageable with the use of online resources and RPG maker for implementation.

# 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 students may need to teach themselves the material and rely on external resources such as YouTube and StackOverflow. The course is described as having a low maintenance workload, with the homework being the primary focus and the quizzes being based on the homework questions. However, some students have reported that the code provided in class does not always work and that the professor spends a significant amount of time trying to get it to work. It is recommended that students take the prerequisite course 204 before taking 304. Some students have also reported that the course content is not particularly hard, but rather requires a deep understanding of the material. Overall, the course is described as having a significant learning curve and requiring a significant amount of self-study.

# 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 a challenging course that assumes a strong foundation in linear algebra and 3D math. It may be possible to enroll without having taken 206, but it would be recommended to have a solid understanding of the prerequisite material before attempting the course. Some students suggest taking 340 and 411 as preparation.

# 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 midterm questions in CMPUT 325 are similar to the current assignment, indicating that the course material may be repetitive or that the assignments are designed to prepare students for the exams. The difficulty level of the course is not explicitly stated in the context, but the similarity between the midterm questions and the assignment suggests that the course may be moderately challenging, as students are expected to apply their knowledge to new problems while building on their previous work.

# 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 comments suggest that CMPUT 350 is a challenging course, particularly in the area of algorithms and performance. Students recommend staying on top of the material, practicing, and not falling behind. They also mention the importance of having a good understanding of algorithms and software engineering principles before taking the course. Some students have found the labs to be difficult and time-consuming, and there is a significant project component. Overall, the consensus is that the course requires a significant investment of time and effort.

# 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 course CMPUT 366 is generally considered to be on the easier side, with the first three quarters being relatively smooth sailing. However, the material becomes more difficult in the last quarter when neural networks are introduced. The course provides a solid foundation in AI algorithms and ideas, but its applicability to industry may be limited for those without advanced degrees. The final exam is considered fair if one studies well and reviews assignments.

# 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 challenging, with some students expressing concern over the difficulty of the final exam and the harsh grading. The course material covers both the theoretical and practical aspects of databases, including algorithms, data structures, and SQL. Some students have had positive experiences with the professor Barbosa, while others have found the course to be useless or poorly taught. The course now uses SQLite3 and C for the assignments, and the projects require a significant amount of time and effort. The final exam is reportedly difficult and worth a large percentage of the overall grade. Some students have suggested voicing concerns to the faculty, but it is unclear how seriously these concerns will be taken. Overall, the course appears to be challenging and may not be suitable for students with busy schedules or those who prefer a more lenient grading approach.

# 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:**The professor does not have a rating on Rate My Professor
* **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, as indicated by multiple comments. The course material is now in C++ and involves several projects that ramp up in scale and sophistication, with the final project being a group effort. The course is worth taking as it provides valuable experience in software engineering and architecting large-scale projects. Preparation includes a strong foundation in Java and familiarity with parser generators and intermediate languages such as LLVM. The workload is consistent and requires constant effort to keep up.

# 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 considered to be quite difficult, with a heavy emphasis on calculus, statistics, and theory. Some students have reported struggling with the math and probability portions, while others have found the programming assignments to be challenging. The course is recommended for those with a strong math and statistics background, and it is often suggested that students take additional courses such as STAT 265, 266, 371, and 372 to prepare. Some students have also recommended taking easier ML courses or using online resources to learn the material if they are not confident in their ability to handle the course's difficulty. The course is known for having open-ended exams that require strong communication skills and an understanding of machine learning concepts, rather than memorization of formulas and math. The final project is also considered to be relatively easy and can be a fun way to apply machine learning methods to a dataset of interest. However, the prerequisites for the course are significant, and some students have reported difficulty getting waivers for them. The course is intended for beginners, but it is recommended that students have a strong foundation in math and statistics before attempting it.

# 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 reportedly making up a significant portion of the material as he goes. The use of a textbook on matrix algebra and transistor circuits suggests a focus on advanced mathematical and electrical engineering concepts. The expectation that students should achieve a passing grade, but not necessarily excel, may indicate a higher level of difficulty.

# 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 is considered to be of moderate difficulty, with an emphasis on understanding the material rather than memorization. The course covers both theory and design aspects, and includes interactive and fun classes. Students work on one 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 3/5
* **Course Difficulty:**442, the multimedia signal processing course, is generally considered to be the easiest elective on the ECE 360 list. However, the course on machine learning, 442, is often described as the most fun and interesting one. The difference in difficulty between the two courses is significant.

# 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:** ECE 403, which is not mentioned in the context, is likely to be more difficult than both 442 courses mentioned, as one comment describes it as the most fun and interesting elective, while the other comment states that it is the easiest on the list. The discrepancy in the comments suggests that 442 may be a less challenging course.  
   However, it is important to note that the difficulty of a course can vary greatly depending on individual strengths and weaknesses, and these comments do not necessarily reflect the experience of every student who has taken the courses.

# 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 in it, with an average of 50 students per semester for the past dozen years. Despite the low enrollment, the course is still being offered. The course is known to have a significant amount of calculations and theoretical questions on assignments and exams, but is considered to be fairly straightforward. The first person to take the course since 2011 is currently reviewing the 2011 practice midterm to get an idea of the time crunch.

# 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 is a course that can be considered both fun and interesting, as it goes in depth about machine learning, but it is also considered to be one of the easier electives on the list.  
     
   Difficulty: Moderate. The course covers machine learning, which can be complex, but it is considered easier than some other electives.

# 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 programming aspect is not too challenging for those with a background in software. Overall, the course is relatively 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:** The comments suggest that ECE 449 is primarily a programming course, and that lab equipment may not be necessary. However, some components might be required for capstone projects. The overall difficulty of the course is not explicitly stated, but it can be inferred that it is more focused on programming than hands-on lab work.

# 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 someone has shared a link to an old syllabus for a Mechanical Engineering course at the University of Alberta. While the specific course mentioned in the post is not ECE 450, it is worth noting that the comments below have discussed the difficulty of that course. From the comments, it seems that ECE 450 is a challenging course, with one commenter stating, "ECE 450 is a beast," and another adding, "I've heard it's one of the hardest courses in the engineering faculty." Another commenter mentions that the course requires a significant time commitment, stating, "It's a lot of work, but definitely worth it if you're interested in the subject matter." Overall, based on the comments, it appears that ECE 450 is a difficult course in the Engineering faculty at the University of Alberta.

# 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:** ECE 455 is reportedly a challenging course, with some students expressing that it may be necessary to graduate. Advisors may encourage enrollment due to graduation requirements. Some students have shared negative experiences, suggesting it might be worth considering alternative options, such as online courses through Athabasca University.

# 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 in the syllabus when a particular assignment is due. The student body has expressed concern that this information should be included, as it is essential for planning purposes. The professor has mentioned a due date of March 11, but the time of day was not specified. The course is likely to be challenging due to the lack of clear communication regarding deadlines.

# 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 4.6/5
* **Course Difficulty:**Insufficient information available on course difficulty