

# Group 2 Electives

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## 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 quite demanding, with a significant workload that includes midterms, finals, labs, and a group project. The tests and labs are reportedly easy if one attends lectures, but the group project can vary greatly depending on the group's dynamics. The average grade is reportedly high, around 3.9, indicating that those who put in the effort can expect good grades. Additionally, for students taking on the music role in the game project, they may find that the time spent on creating sound effects outweighs the time spent on creating music tracks, but the use of online sources can help mitigate this. Overall, the course is challenging and requires a considerable investment of time.

## 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 low maintenance assignments and easy exams, but some students mention that they struggled to understand the concepts and that the professor did not effectively explain them in class. It is recommended that students take the prerequisite course 204 before attempting 304. Overall, the course is seen 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 prerequisites that include knowledge from CMPUT 206, 308, or 411. Some students suggest that having a strong background in 3D math, particularly Linear Algebra II, is beneficial. The textbook for the course, 366, has been criticized for being incomplete and poorly written, with assignments reportedly taking a long time to be marked and exams heavily relying on memorization of formulas. Some students have expressed frustration with the course's difficulty and the lengthy wait for marks. It is also mentioned that 403, which focuses on algorithmic concepts, could be a viable alternative for those interested in that area.

## 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 course CMPUT 325 is known to have exams with questions similar to the assignments, indicating a moderate to high level of difficulty. There have been instances of students becoming visibly distressed during exams, suggesting a challenging academic experience. However, it is also mentioned that students have taken the course before and succeeded, implying that it is not impossible. The presence of a water bottle left behind during an exam from many years ago may indicate long hours spent studying for the exams. Overall, the course appears to be challenging but doable.

## **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 areas of algorithms and performance. Students recommend staying on top of the material, practicing consistently, and seeking help from TAs and other resources when needed. The course is also project-heavy, with significant assignments and a group project. Some students have reported struggling with the labs and finding them overwhelming. It is recommended that students have a strong foundation in C++ and algorithms before taking the course. Additionally, some students have suggested that

taking courses like CMPUT 204 and 301 before 350 could be beneficial for preparing students for the course's intensity. Overall, the course is described as demanding and requiring a significant time commitment.

## 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 described as being easy by some students, while others hold it in high regard due to the exceptional teaching abilities of the professor Dr. Sutton. The absence of Dr. Sutton from the course may impact its perceived difficulty.

## 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 structure of the course. Some students have had positive experiences with the course, particularly with regards to the professor and the projects, while others have found it to be a waste of time and effort. The course covers the in-depth workings of a DBMS and includes topics such as table scans, joins, and various types of databases. Some students have recommended avoiding the course if possible, while others have encouraged speaking out about concerns to the faculty. The course has been restructured in recent semesters and now uses SQLite3 and C for the assignments. The difficulty level of the course appears to vary depending on the professor teaching it.

## **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:**  
CMPUT 415 is a challenging course with a significant workload, as indicated by multiple comments. The course material is now in C++ and involves implementing a LLVM based compiler for a defunct IBM language. There are several projects, each increasing in scale and sophistication, and a midterm and final exam. The course requires a strong background in Java and familiarity with parser generators and intermediate languages. The workload is constant and intense, with students encouraged to start working on the next assignment as soon as the previous one is completed. Despite the challenges, many students find the course rewarding and a valuable learning experience.

## 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 challenging, especially for those who dislike math and theory. 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 struggle with math. Alternatively, there are machine learning courses with fewer math requirements, such as CMPUT 267, and online courses available on platforms like Coursera. The course covers a range of topics, including machine learning methods, written scientific reports, and programming in Python. The assignments can be challenging, particularly for those with weaker math backgrounds, and the exams require a strong understanding of machine learning concepts and the ability to communicate them clearly. It is also recommended to take courses with prerequisites such as STAT 252 and linear algebra before attempting CMPUT 466.

## 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 ECE 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 on the fly. The use of a textbook, Basic Matrix Algebra and Transistor Circuits, suggests a more traditional curriculum, but the comments indicate that this may not be the case. The expectation that students will pass with a C or above further underscores the perceived 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:**  
ECE 321 is considered to be a moderately difficult course, with an emphasis on understanding the material rather than memorization. The course covers both theory and design aspects, and students work on one project throughout the semester in the labs, 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 described as both the most fun and interesting elective, as well as the easiest course on a given list. However, it should be noted that the curriculum may have changed since the initial comments were made. If you are considering taking this course and have further questions, it may be helpful to consult the ECE labs discord or start a discussion on e-class. The overall reported difficulty of this course appears to be relatively low.

## 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 is known for its depth and complexity in the field of electrical and computer engineering. The comments suggest that 442 provides a more enjoyable and interesting learning experience, likely due to its focus on machine learning. However, the curriculum for both courses may change over time, so it's always a good idea to consult the current course descriptions for the most accurate information. Overall, ECE 403 is likely to be more challenging than 442.

## 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:**  
Insufficient information available on course difficulty

## 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:**  
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 for someone with a background in software. 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:**  
The comments suggest that ECE 449 may not require the use of a lab kit, as it may primarily consist of programming labs. However, some components may still be needed for capstone projects. The overall difficulty of the course is unclear based on this information.

## 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 is not ECE 450, it is possible to infer some information about the difficulty of ECE 450 based on the general context.

The syllabus indicates that the Mechanical Engineering course in question is a 400-level course, which is typically the level for advanced undergraduate courses. The presence of an old syllabus suggests that the course may have undergone some changes since then, potentially making it more or less difficult.

However, without more specific information about ECE 450, it is impossible to make an accurate assessment of its difficulty based on this context alone. It is worth noting that the difficulty of a course can vary greatly from year to year, depending on the specific instructor and teaching assistant, as well as the content covered.

Therefore, based on the context provided, it is unclear how difficult ECE 450 is, but it is likely to be a challenging advanced undergraduate course in Electrical and Computer Engineering.

## 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. One person describes it as an "absolute ass," while another suggests that it might be worth considering taking a different course, such as ECE 442, which is reportedly more enjoyable and easier. The latter course is described as being about machine learning. The third comment indicates that ECE 442 is a multimedia signal processing course and is considered to be the easiest on the list. Therefore, based on the comments, ECE 455 appears to be a more difficult course than ECE 442.

## 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. However, according to some students, the professor mentioned the due date as March 11, in the evening. The students were concerned that this information was not included in the syllabus and felt that it should

be. The course is likely to have a certain level of ambiguity and unpredictability in its requirements.

## 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