

# Electrical Engineering at the University of Alberta

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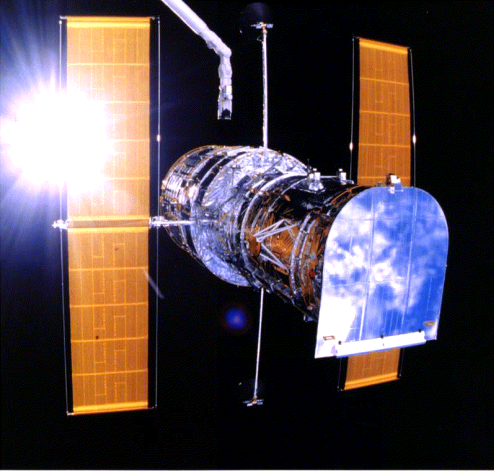
**EE Program Director**



UNIVERSITY OF  
ALBERTA



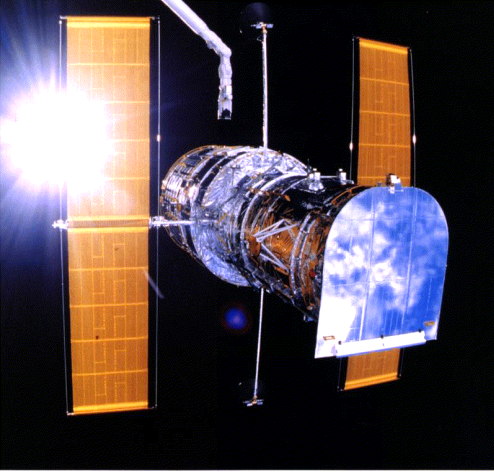
ELECTRICAL AND COMPUTER  
ENGINEERING



# Electrical Engineering Curriculum



- Years 2 and 3 cover all core activities of the electrical engineering profession.
- Year 4 includes ~6 elective courses that allow students to explore their areas of interest.
- Lots of good job opportunities after graduation in Alberta and Canada.



# Outline



- Second year
  - List of courses
  - Pre/co-requisite dependencies
  - What you will learn by the year end
- Third year
  - List of courses
  - Pre/co-requisite dependencies
  - What you will learn by the year end
- Fourth year
  - List of courses
  - Technical electives



## Second Year



### Common to both program options

#### Fall Term

ECE 201: Today's course!

ECE 202: Electrical Circuits I

ECE 210: Introduction to Digital  
Logic Design

Math 201: Differential Equations

Math 209: Calculus III

Group I (Interdisciplinary)  
Program Elective \*

English Elective

#### Winter Term

ECE 203: Electrical Circuits II

ECE 212: Introduction to  
Microprocessors

ECE 220: Programming for E. Eng

ECE 240: Cont. Time Signals and  
Systems

PHYS 230: Electricity and  
Magnetism

Complementary Studies Elective  
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\* From CH E 243, MAT E 201 and MEC E 250

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\*\* See Sec. 84.6 of Calendar for a list of courses



# Second Year's Pre/Co-Requisite Dependencies



Electrical (& Electrical: Nanoeng Option)	
Year 2	
<b>Term 3</b> ECE 201 (1 day) ECE 202 (3-1s-3/2) ECE 210 (3-0-3/2) MATH 201 (3-0-1) MATH 209 (3-0-1) Group I Program Elective English Elective (3-0-0)	<b>Term 4</b> ECE 203 (3-1s-3/2) ECE 212 (3-0-3/2) ECE 220 (3-0-3/2) ECE 240 (3-1s-0) PHYS 230 (3-0-3/2) Complementary Studies Elective

Math 101 → ECE 201 (1 day)  
 Math 102 → ECE 202 (3-1s-3/2)

ECE 202 (3-1s-3/2) → ECE 203 (3-1s-3/2)  
 ECE 202 (3-1s-3/2) → ECE 212 (3-0-3/2)  
 ECE 210 (3-0-3/2) → ECE 212 (3-0-3/2)  
 ECE 210 (3-0-3/2) → ECE 220 (3-0-3/2)  
 MATH 201 (3-0-1) → ECE 240 (3-1s-0)  
 MATH 209 (3-0-1) → PHYS 230 (3-0-3/2)

(Information as general guideline only; always consult the UofA Calendar.)



At the end of the second year you will:

- Have a good understanding of **electrical circuits**
  - Circuits are the bread and butter of electrical engineering
  - Very important in future courses in electronics, power systems, etc.
- Have a good understanding of **digital systems**, including how computers and most digital systems work (digital clocks, audio systems, etc.)
- Be competent **programming** and using computers in engineering applications.
- Understand the concept of **electric signals**, and mathematical **models of dynamical systems**.
  - very important for understanding of radio transmission.
  - also important to the understanding of control systems.



# Third Year Regular Program



## Fall Term

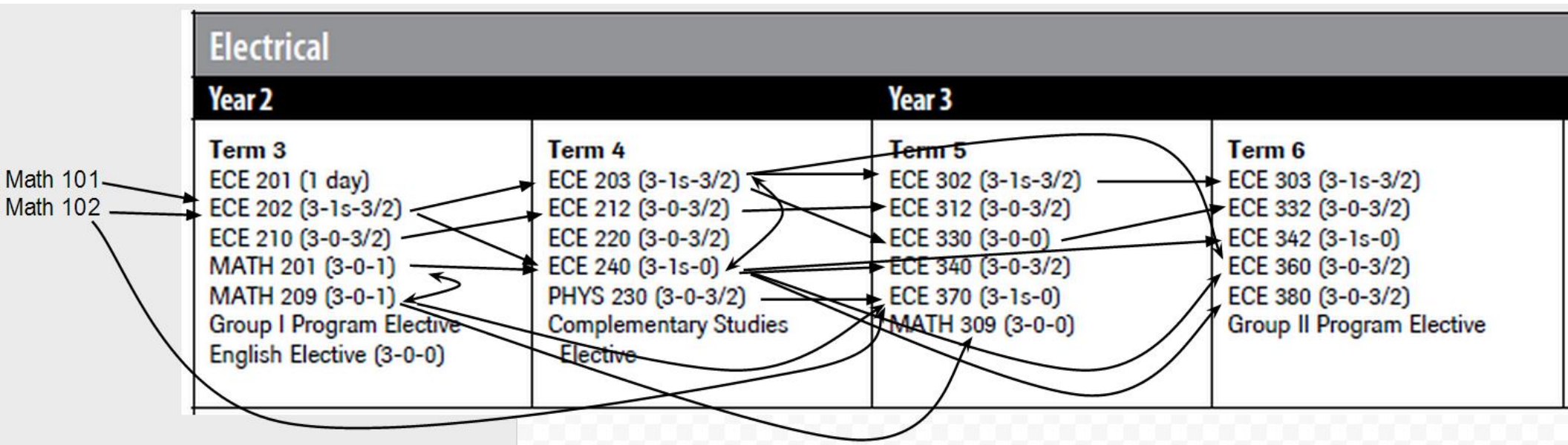
ECE 302: Electronic Devices  
ECE 312: Embedded System  
Design  
ECE 330: Introduction to Power  
Engineering  
ECE 340: Discrete-time Signals  
and Systems  
ECE 370: Eng. Electromagnetics  
Math 309: Math Methods for EE

## Winter Term

ECE 303: Analog Electronics  
ECE 332: Electric Machines  
ECE 342: Probability for ECE  
ECE 360: Control Systems I  
ECE 380: Introduction To  
Communication Systems  
Group II Program Elective



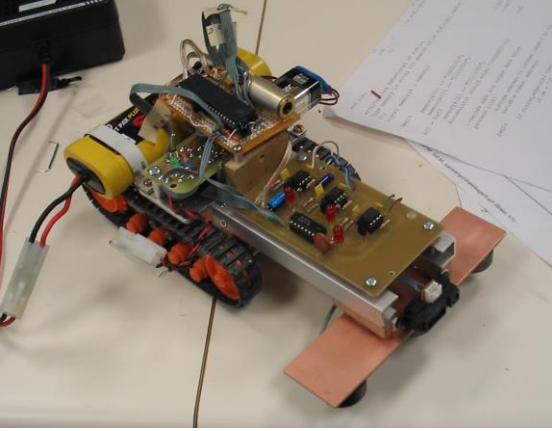
# Second and Third Years' Pre/Co-Requisite Dependencies



(Information as general guideline only; always consult the UofA Calendar.)

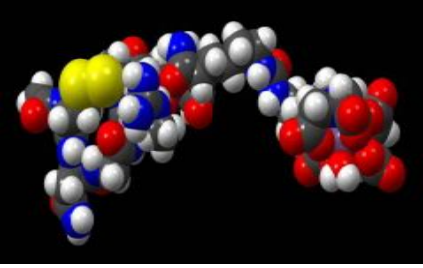
- **Failing 2<sup>nd</sup> year courses can delay your graduation by a year!!**
- Among the 2<sup>nd</sup> year courses, Group I Program Elective, English Elective, and Complementary Studies Elective can be taken at a later time.
- In the 3<sup>rd</sup> year, failing ECE 302 or ECE 330 is most consequential.



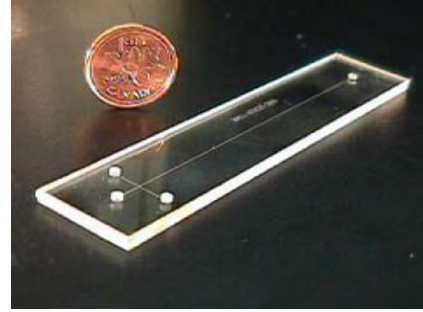


At the end of the third year you will:

- Have a good understanding of **electronic devices** and how to use them to implement electronic circuits.
  - you will have the opportunity to design (and see working!) an amplifier and a power supply.
- Understand **power systems**, power distribution, and power machines (electric motors, generators, transformers, etc.)
- Understand how **communication systems** work (AM, FM signals, digital communications, etc.)
- Understand **electromagnetic radiation**.
- Understand **digital signals** and how to manipulate them.
- Understand **control systems**.



# Third Year Nanoengineering Option

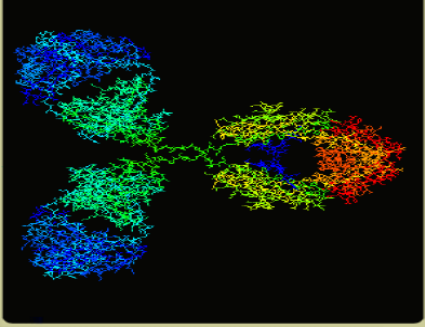


- The third year in the Nano Option is very similar to that in the regular program.
- Students in this option do Not take ECE 330 Power Systems and ECE 332 Power Machines. Instead they take:

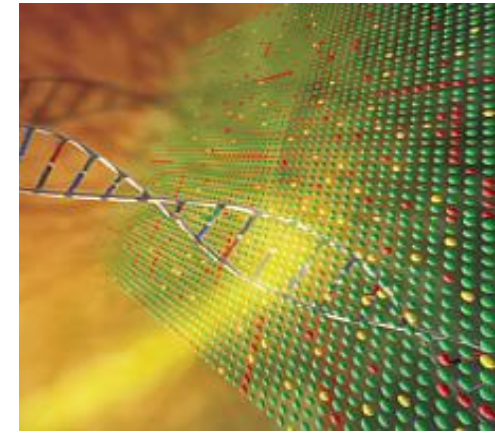
ECE 341: Analytical methods in EE

ECE 450: Nanoscale phenomena in electronic devices

ECE 456: Introduction to nanoelectronics

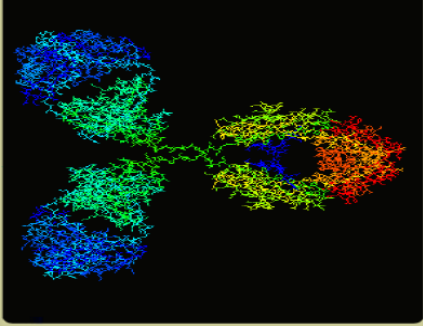


# Fourth Year Regular program

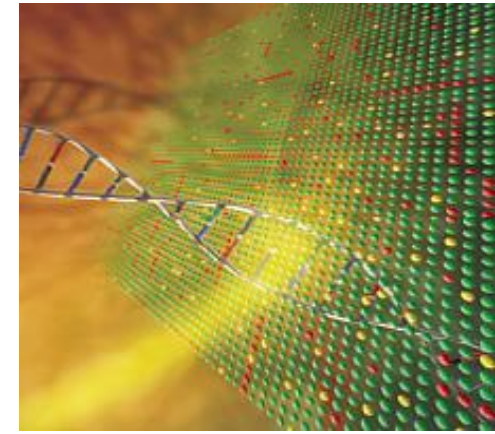


- Capstone design ECE 490 and ECE 491
- The rest of the courses and primarily technical electives.

Year 4	
<b>Term 7</b> ECE 490 (1-0-3) Group I Program Elective Group II Program Elective Group II Program Elective Group II Program Elective Complementary Studies Elective (3-0-0)	<b>Term 8</b> ECE 491 (1-0-3) ENG M 310 (3-0-0) or 401 (3-0-0) ENGG 400 (1-0-0) Group II Program Elective Group II Program Elective Group II Program Elective ITS Elective (3-0-0)



# Fourth Year Nanoengineering Option



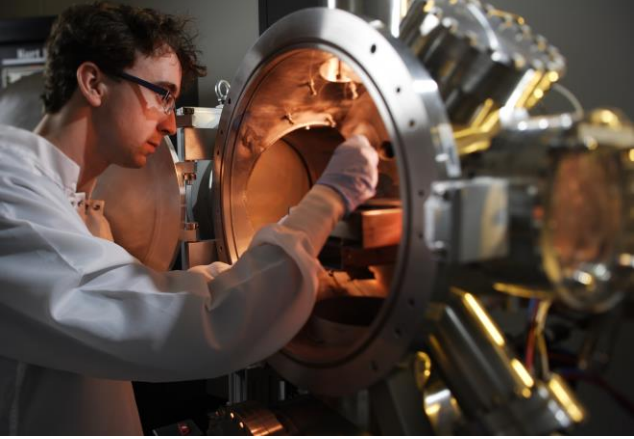
- Same as the regular program except that students in the Nano Option also take the following compulsory courses:

ECE 457: Microfabrication and Devices

ECE 471: Photonics I

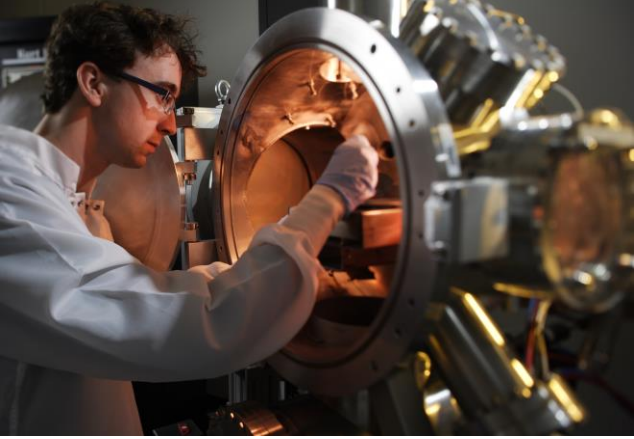
ECE 475: Optoelectronics and Photovoltaic Devices

Year 4	
<b>Term 7</b> ECE 457 (3-0-2) ECE 471 (3-0-3/2) ECE 490 (1-0-3) Complementary Studies Elective (3-0-0) Group II Program Elective Group II Program Elective	<b>Term 8</b> ECE 475 (3-0-0) ECE 491 (1-0-3) ENG M 310 (3-0-0) or 401 (3-0-0) ENGG 400 (1-0-0) Complementary Studies Elective (3-0-0) Group II Program Elective Group II Program Elective



## Technical Electives (TEs)

- A lot to choose from – the department offers more than 40 TEs.
- **TEs cover all areas (power systems, control, electronics, multimedia systems, image processing, antenna design, etc.)**
- Choosing TEs you will have the opportunity to shape your career by focusing on the area(s) that you most like.
- **Sec. 84.5.4 Electrical of the Calendar** about Group II Electives:  
*Of the seven program electives in this group, at least 3 must be from  
ECE 304, 401, 402, 403, 410, 432, 433, 440, 442, 449, 450, 457, 460,  
461, 471, 475, 485  
and at most 2 program electives may be chosen from  
BME 513  
ECE 405, one of 408 or 409, 412, 413, 452, 487.  
The other program electives may be chosen from  
ECE 341, 430, 434, 456, 458, 464, 472, 474, 476, 478, 486, 489*



## Technical Electives (TEs)

- **Sec. 84.5.4.2 Electrical: Nanoengineering Option of the Calendar**  
about Group II Electives:

*Of the 4 program electives in this group, at least 2 must be from*

*ECE 304, 452, 457, 458, 475*

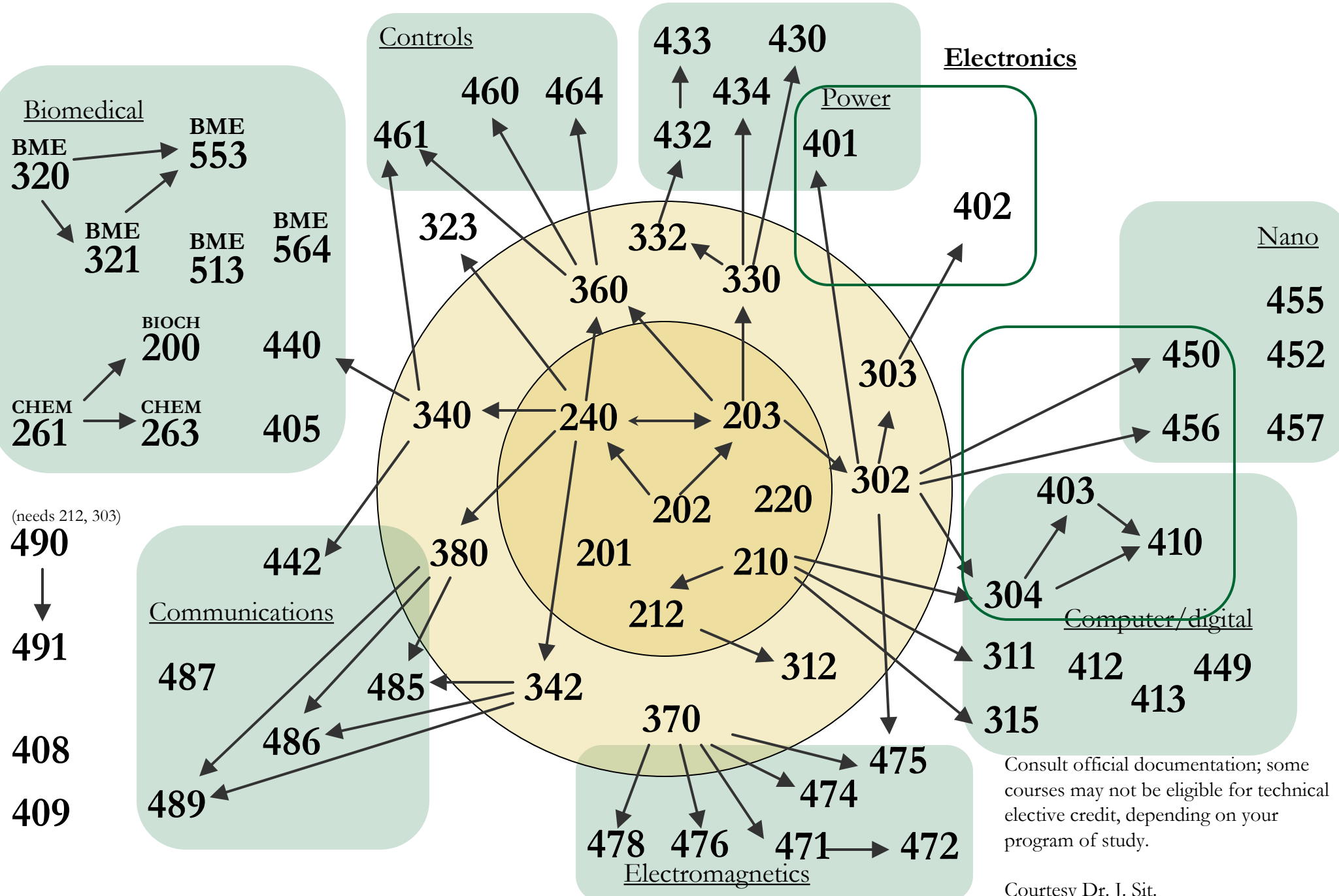
*and the remainder from*

*BME 513, 553, 564*

*ECE 330, 332, 380, 401, 402, 403, 405, one of 408 or 409, 410, 430, 440, 449, 455, 460, 464, 472, 474, 476, 478.*

# ECE course roadmap

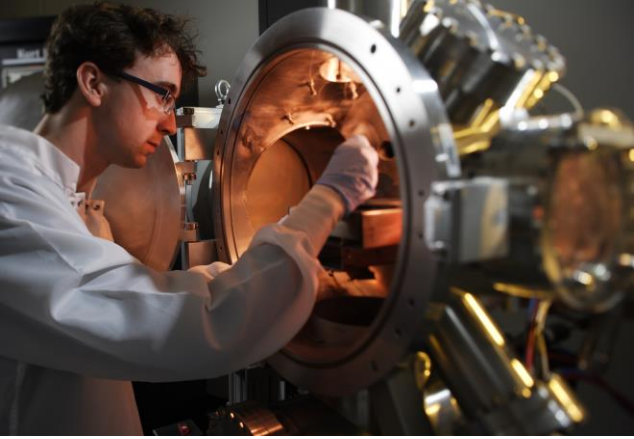
→ indicates prerequisite



Consult official documentation; some courses may not be eligible for technical elective credit, depending on your program of study.

Courtesy Dr. J. Sit.





## Help with course selection

- There will be plenty of help provided to select your courses. Consult

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- Download this presentation:

<http://www.ece.ualberta.ca/~mtavakol> (click on Courses)