

RUTGERS

School of Engineering

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Capstone Design Tracks in Electrical and Computer Engineering

Capstone design courses are undergoing modifications and revisions. In general, a student can do a valid capstone design project initiated by him/her and approved by the undergraduate director as long as the project pertains to Electrical and Computer Engineering. In such a case, no traditional pre-requisite courses are necessary, however the student needs to justify before beginning the project work that he/she is capable of carrying out the proposed project.

Several possible capstone design tracks, which are normally offered, are outlined below. However, some other tracks are possible on ad hoc basis depending on our faculty interests in opening up new and emerging areas in Electrical and Computer Engineering.

Guidance for Electrical Engineering Option with a focus in Electronics

There are several possible tracks in the area of Electronics. Three possible tracks are illustrated below. For each track, the required and advisable elective courses are given below. For some elective locations, whenever no course is specified, one can freely select them from the list of electives given in the handbook. Course offerings as given below are most often followed, however, exceptions can arise. Some courses might be switched from Fall to Spring and vice versa.

Electromagnetics and optoelectronics:

- 14:332:382 Electromagnetic Fields (Required course, Spring Semester of Junior year)
- :---:---- Technical Elective (Spring Semester of Junior year)
- 14:332:466 Optoelectronics (Required course, Fall Semester of Senior year)
- 14:332:481 Electromagnetic Waves (Required course, Fall Semester of Senior year)
- 14:332:465 Physical Electronics (Required course, Fall Semester of Senior year)
- 14:332:463 Analog Electronics (Advisable, Fall Semester of senior year)
- 14:332:468 Capstone Design - Electronics (Required course, Spring Semester of Senior year)

Electronic Circuits:

- 14:332:460 Power Electronics (Advisable, Spring Semester of Junior year)
- :---:---- Technical Elective (Spring Semester of Junior year)
- 14:332:---- Electrical Elective (Fall Semester of Senior year)
- 14:332:463 Analog Electronics (Required course, Fall Semester of Senior year)
- 14:332:465 Physical Electronics (Required course, Fall Semester of Senior year)
- 14:332:468 Capstone Design - Electronics (Required course, Spring Semester of Senior year)
- 14:332:---- Electrical Elective (Spring Semester of Senior year)

Microelectronic Processing:

- 14:332:460 Power Electronics (Advisable, Spring Semester of Junior year)
- :---:---- Technical Elective (Spring Semester of Junior year)
- 14:332:463 Analog Electronics (Advisable, Fall Semester of senior year)
- 14:332:465 Physical Electronics (Required course, Fall Semester of Senior year)
- 14:332:467 Intro to Microelectronic Processing (Required course, Fall Semester of Senior year)
- 14:332:468 Capstone Design - Electronics (Required course, Spring Semester of Senior year)
- 14:332:---- Electrical Elective (Spring Semester of Senior year)

Guidance for Electrical Engineering Option with a focus in Communications

There are two possible tracks in the area of communications. For each track, the required and advisable elective courses are given below. For some elective locations, whenever no course is specified, one can freely select them from the list of electives given in the handbook.

Communication Systems - Hardware:

14:332:322 Principles of communication systems (Required course, Spring Semester of Junior year)

01:640:250 Intro to Linear Algebra (highly advisable technical elective, Spring Semester of Junior year)

14:332:421 Wireless Communication Systems (Highly Advisable, Fall Semester of senior year)

14:332:427 Communication System Design (Required course, Fall Semester of senior year)

14:332:423 Computer and Communication Networks
(Advisable, Fall Semester of senior year, Take it in place of Technical Elective or Science Math and Eng'g elective)

14:332:428 Capstone Design - Communication Systems (Required course, Spring Semester of senior year)

14:332:424 Intro to Information and Network Security (Advisable, Spring Semester of senior year)

Wireless Communication Systems:

14:332:322 Principles of communication systems (Required course, Spring Semester of Junior year)

01:640:250 Intro to Linear Algebra (highly advisable technical elective, Spring Semester of Junior year)

14:332:421 Wireless Communication Systems (Required course, Fall Semester of Senior year)

14:332:427 Communication System Design (Highly Advisable, Fall Semester of Senior year)

14:332:423 Computer and Communication Networks
(Advisable, Fall Semester of Senior year, Take it in place of Technical Elective or Science Math and Eng'g elective)

14:332:428 Capstone Design - Communication Systems (Required course, Spring Semester of Senior year)

14:332:424 Intro to Information and Network Security (Advisable, Spring Semester of Senior year)

Guidance for Electrical Engineering Option with a focus in Control and DSP

There are two possible tracks in the area of Systems and Digital Signal Processing. For each track, the required and advisable elective courses are given below. For some elective locations, whenever no course is specified, one can freely select them from the list of electives given in the handbook.

Automatic Control:

- 14:332:346 Digital Signal Processing (This is a standard required course in Electrical Option)
- 14:332:---- Electrical Elective (Spring Semester of Junior year)
- 01:640:250 Intro to Linear Algebra (highly advisable technical elective, Spring Semester of Junior year)
- 14:332:415 Intro to Automatic Control (Fall Semester of Senior year, This course is not offered often, if not offered, take an EE elective)
- 14:332:417 Control System Design (Required course, Fall Semester of Senior year)
- 14:332:463 Analog Electronics (Advisable, Fall Semester of Senior year)
- 14:332:418 Capstone Design - Systems and Digital Signal Processing (Required course, Spring Semester of Senior year)
- 14:332:---- Electrical Elective (Spring Semester of Senior year)

Digital Signal Processing:

- 14:332:346 Digital Signal Processing (This is a standard required course in Electrical Option)
- 14:332:---- Electrical Elective (Spring Semester of Junior year)
- 01:640:250 Intro to Linear Algebra (highly advisable technical elective, Spring Semester of Junior year)
- 14:332:447 Digital Signal Processing Design (Required course, Fall Semester of Senior year)
- 14:332:463 Analog Electronics (Advisable, Fall Semester of Senior year)
- :---:---- Technical Elective (Fall Semester of Senior year)
- 14:332:418 Capstone Design - Systems and Digital Signal Processing (Required course, Spring Semester of Senior year)
- 14:332:---- Electrical Elective (Spring Semester of Senior year)

Guidance for Electrical Engineering Option with a focus in VLSI DESIGN

One can do a capstone design project in VLSI Design following Computer Engineering option as well (See for details discussed in Computer Engineering option).

VLSI Design:

14:332:---- Power Electronics (Advisable, Spring Semester of Junior year)
--:--:---- Technical Elective (Spring Semester of Junior year)
14:332:465 Physical Electronics (Advisable, Fall Semester of Senior year)
14:332:467 Microelectronic Processing
(Advisable, Fall Semester of Senior year, Take it in place of Technical Elective)
14:332:479 VLSI Design (Required course, Fall Semester of Senior year)
14:332:438 Capstone Design - Computers (Required course, Spring Semester of Senior year)
14:332:482 Deep Submicron VLSI Design
(Highly advisable electrical elective, Spring Semester of Senior year)

VLSI Design and Microelectronic Processing:

Those students interested in coupling Microelectronic Processing with VLSI Design can follow the schedule given below:

14:332:---- Power Electronics (Advisable, Spring Semester of Junior year)
--:--:---- Technical Elective (Spring Semester of Junior year)
14:332:465 Physical Electronics (Required course, Fall Semester of Senior year)
14:332:467 Microelectronic Processing (Required, Fall Semester of Senior year)
(Take it in place of Technical Elective)
14:332:479 VLSI Design (Required course, Fall Semester of Senior year)
14:332:438 Capstone Design - Computers (Required course, Spring Semester of Senior year)
14:332:468 Capstone Design - Electronics (Required course, Spring Semester of Senior year)
14:332:482 Deep Submicron VLSI Design (highly advisable electrical elective, Spring Semester of Senior year, take it in place of Science Math and Eng'g elective)

Note that in this track, students would do two capstone design projects one in Computers (VLSI Design) and the other in Electronics (Microelectronic Processing).

Guidance for Electrical Engineering Option with a focus in Robotics and Computer Vision

One can do a capstone design project in Robotics and Computer Vision following Computer Engineering option as well (See for details discussed in Computer Engineering option).

Robotics and Computer Vision:

14:332:346 Digital Signal Processing (This is a standard required course in Electrical Option)

14:332:---- Electrical Elective (Spring Semester of Junior year)

01:640:250 Intro to Linear Algebra (highly advisable technical elective, Spring Semester of Junior year)

14:332:472 Intro to Robotics and Computer Vision (Required course, Fall Semester of Senior year)

14:332:---- Electrical Elective (Fall Semester of Senior year)

--:--:---- Technical Elective (Fall Semester of Senior year)

14:332:438 Capstone Design - Computers (Required course, Spring Semester of Senior year)

14:332:---- Electrical Elective (Spring Semester of Senior year)

Capstone Design in Virtual Reality:

14:332:376 Virtual Reality (Required course, Spring Semester of Junior year)

14:332:378 Virtual Reality Lab (Required course, Spring Semester of Junior year)

14:332:478 Capstone Design - Virtual Reality (Required course, Spring Semester of Senior year)

Other elective courses to satisfy degree requirements.

Guidance for Computer Engineering Option

Besides Capstone Design in Virtual Reality, there are four possible tracks in the area of Computer Engineering. For each track, the required and advisable elective courses are given below. For some elective locations, whenever no course is specified, one can freely select them from the list of electives given in the handbook.

Software and Systems:

14:332:452 Software Engineering (This is a standard required course in Computer Option)
14:332:456 Network-Centric Programming
(Highly advisable computer/Tech elective if offered, Spring Semester of Junior year, if not offered take a Computer elective)
14:332:451 Intro to Parallel and Distributed Programming
(Required computer elective, Fall Semester of Senior year)
---:---:---- Tech Elective (Fall Semester of Senior year)
14:332:438 Capstone Design - Computers (Required course, Spring Semester of Senior year)
---:---:---- Computer/Technical Elective (Spring Semester of Senior year)

Digital System Design:

---:---:---- Computer/Tech Elective (Spring Semester of Junior year)
14:332:437 Digital System Design (This is a standard required course in Computer Option)
---:---:---- Computer Elective (Fall Semester of Senior year)
---:---:---- Tech Elective (Fall Semester of Senior year)
14:332:438 Capstone Design - Computers (Required course, Spring Semester of Senior year)
---:---:---- Computer Elective (Spring Semester of Senior year)

VLSI Design:

One can do a capstone design project in VLSI Design following Electrical Engineering option as well (See for details discussed in Electrical Engineering option).

---:---:---- Computer/Tech Elective (Spring Semester of Junior year)
14:332:479 Intro to VLSI Design (Required course, Fall Semester of Senior year)
---:---:---- Tech Elective (Fall Semester of Senior year)
14:332:438 Capstone Design - Computers (Required course, Spring Semester of Senior year)
14:332:482 Deep Submicron VLSI Design (Highly advisable computer elective, Spring Semester of Senior year)

Robotics and Computer Vision:

One can do a capstone design project in Robotics and Computer Vision following Electrical Engineering option as well (See for details discussed in Electrical Engineering option).

01:640:250 Intro to Linear Algebra (highly advisable technical elective, Spring Semester of Senior year)
14:332:472 Intro to Robotics and Computer Vision (Required course, Fall Semester of Senior year)
---:---:---- Computer Elective (Fall Semester of Senior year)
14:332:438 Capstone Design - Computers (Required course, Spring Semester of Senior year)
---:---:---- Computer Elective (Spring Semester of Senior year)