

UNIT REPORT

Electrical & Computer Engr- Academic - APR Self-Study Report by Academic Unit/Department

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Program Mission

Electrical and Computer Engineering Mission

Program Mission Statement:

The mission of the department is to educate students for the professional practice of electrical and computer engineering by offering undergraduate and graduate programs that encourage lifelong learning, foster teamwork and leadership, and promote creative discovery.

Program Goal (add a minimum of 3 program goal "plan items")

Goal 1. Engage and Contribute

Goal Statement:

Within a few years of completing their Computer Engineering or Electrical Engineering degrees at the University of Idaho, our graduates, collectively, are expected to engage and contribute solutions to the latest problems in industry, government, non-profit organizations or academia through application of their engineering knowledge.

Alignment to UI Strategic Plan Goals:

Engage (Goal 2): Suggest and influence change that addresses societal needs and global issues, and advances economic development and culture.

Indicators/Metrics to Evaluate Progress:

Successful ABET review and accreditation every 6 years, learning objectives regularly achieved at undergraduate and graduate levels. Our last successful ABET review of the BSEE and BSCompE was completed in 2019, the next review will be in 2025.

List of Actions the Program Will Take to Achieve Goals :

The Department ECE is using the three Program Educational Objectives (PEOs) from our required ABET accreditation process as our Program Goals. It is the ongoing goal of our program to educate students at the undergraduate and graduate levels such that they achieve these objectives. Our Program Goals are ongoing, reviewed annually, and assessed cumulatively during the ABET accreditation visits which occur on a 6-year cycle.

Goal Achievement Level: In Progress

Goal 2. Professional Growth

Goal Statement:

Within a few years of completing their Computer Engineering or Electrical Engineering degrees at the University of Idaho, our graduates, collectively, are expected to continue their professional growth through graduate studies, professional training, and other educational opportunities.

Alignment to UI Strategic Plan Goals:

Innovate (Goal 1): Scholarly and creative products of the highest quality and scope, resulting in significant positive impact for the region and the world.

Engage (Goal 2): Suggest and influence change that addresses societal needs and global issues, and advances economic development and culture.

Transform (Goal 3): Increase our educational impact.

Indicators/Metrics to Evaluate Progress:

Successful ABET review and accreditation every 6 years, learning objectives regularly achieved at undergraduate and graduate levels. Our last successful ABET review of the BSEE and BSCompE was completed in 2019, the next review will be in 2025.

List of Actions the Program Will Take to Achieve Goals :

The Department of ECE is using the three Program Educational Objectives (PEOs) from our required ABET accreditation process as our Program Goals. It is the ongoing goal of our program to educate students at the undergraduate and graduate levels such that they achieve these objectives. Our Program Goals are ongoing, reviewed annually, and assessed cumulatively during the ABET accreditation visits which occur on a 6-year cycle.

Goal Achievement Level: In Progress

Goal 3. Serve Society

Goal Statement:

Within a few years of completing their Computer Engineering or Electrical Engineering degrees at the University of Idaho, our graduates, collectively, are expected to serve society through collaboration and volunteering across public, private governmental, and non-profit sectors.

Alignment to UI Strategic Plan Goals:

Engage (Goal 2): Suggest and influence change that addresses societal needs and global issues, and advances economic development and culture.
 Cultivate (Goal 4): Foster an inclusive, diverse community of students, faculty, and staff and improve cohesion and morale.

Indicators/Metrics to Evaluate Progress:

Successful ABET review and accreditation every 6 years, learning objectives regularly achieved at undergraduate and graduate levels. Our last successful ABET review of the BSEE and BSCompE was completed in 2019, the next review will be in 2025.

List of Actions the Program Will Take to Achieve Goals :

The Department of ECE is using the three Program Educational Objectives (PEOs) from our required ABET accreditation process as our Program Goals. It is the ongoing goal of our program to educate students at the undergraduate and graduate levels such that they achieve these objectives. Our Program Goals are ongoing, reviewed annually, and assessed cumulatively during the ABET accreditation visits which occur on a 6-year cycle.

Goal Achievement Level: In Progress

Student Learning Assessment Report (add one "plan item" for each major, degree, and/or certificate offered by dept)

Electrical Engineering BS

Assessment Report Contact: James Frenzel

Program Changes in Past Year:

There have been no changes in the last year.

Learning Outcomes are Communicated to All Students in Program (check box if true): true

Learning Outcomes are Communicated to All Faculty (check box if true): true

Optional: Framework Alignment: ABET

Import Outcomes Data (from Anthology Outcomes):

Electrical Engineering Student Outcomes: (The numbers in the parentheses indicate which Program Educational Objectives/Goals that each outcome supports)

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (1)
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (1)
3. an ability to communicate effectively with a range of audiences (3)
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (3)
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives (3)
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (1)
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (2)

Summary of Student Learning:

Program Goals/Program Educational Objectives are indirectly measured using Student Outcomes. The following is a listing of the Goals and the Student Outcomes with an indication of which Program Educational Objectives/Goal(s) it supports. Not all Student Outcomes are measured each semester. The attached files contain summaries of Student Outcome assessment for the Spring 2021 semester.

The Department of ECE's BS in Electrical Engineering ABET Self-Study is attached. It gives a detailed of what, when, and how data is collected and used continuously improve the BS in Electrical Engineering Program.

Electrical Engineering Program Educational Objectives/Goals:

Within a few years of completing their Computer Engineering degrees at the University of Idaho, our graduates are, collectively, expected to:

1. Engage and contribute solutions to the latest problems in industry, government, non-profit organizations or academia through application of their engineering knowledge;
2. Continue their professional growth through graduate studies, professional training, and other educational opportunities; and
3. Serve society through collaboration and volunteering across public, private, governmental, and non-profit agencies.

Electrical Engineering Student Outcomes: (The numbers in the parentheses indicate which Program Educational Objectives/Goals that each outcome supports)

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6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (1)
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (2)

Attached Files

- [Asses. EE Outc ECE 351 Spring 2021.doc](#)
- [Asses. EE Outc \(1\) ECE 350 Spring 2021 Sullivan.doc](#)
- [ECE 340 EE Outcome \(1\) - S21.doc](#)
- [ECE 341 EE Outcome \(6\) - S21.doc](#)
- [ece310_EE_Outcome\(1\)-Spring_2021 - Suat Ay.pdf](#)
- [ECE 440 EE Outcome \(2\) - S21.docx](#)
- [Feng Li Assessment_Spring2021-ECE481 483.doc](#)
- [EE-JFF-27Jun2019.pdf](#)

Summary of Faculty Discussion:

At the first faculty meeting of each semester the Assessment Committee presents assessment data from the previous semester and facilitates discussion if any changes might be needed. No changes were proposed.

Summary of Changes/Improvements Being Considered:

No changes being considered.

Inter-rater Reliability:

The Assessment committee reviews each faculty's evaluation of student comes and provides direct feedback to the faculty members if required. If there is not positive response from the faculty member, the committee refers the issue to the Department Chair and the Chair works with the faculty member until the issue is resolved.

Closing the Loop:

Assessment is never complete; it is an ongoing process. Attached is our most recent ABET self-study, completed in 2019. The next ABET review will occur in 2025.

Attached Files

- [EE-JFF-27Jun2019.pdf](#)

Electrical Engineering ME/MS

Assessment Report Contact: James Frenzel

Program Changes in Past Year:

There have been no changes in the last year.

Learning Outcomes are Communicated to All Students in Program (check box if true): true

Learning Outcomes are Communicated to All Faculty (check box if true): true

Optional: Framework Alignment: None

Import Outcomes Data (from Anthology Outcomes):

The desired student outcomes for a Masters in Electrical Engineering are:

1. **Knowledge Base:** An in-depth knowledge of the degree subject matter, integrating and building upon the foundation provided by a relevant undergraduate degree.
2. **Conceptualize and Design Projects:** The ability to use the results of applied research and other existing information necessary to carry an engineering project from conceptual through the design and production phases.
3. **Communicate:** The ability to communicate professional work in an appropriate format.
4. **Global Citizenship:** An understanding of the responsibilities to enhance the quality of life of the global community through the practice of engineering.

Summary of Student Learning:

The desired student outcomes for a Masters in Electrical Engineering are:

1. **Knowledge Base:** An in-depth knowledge of the degree subject matter, integrating and building upon the foundation provided by a relevant undergraduate degree.
2. **Conceptualize and Design Projects:** The ability to use the results of applied research and other existing information necessary to carry an engineering project from conceptual through the design and production phases.
3. **Communicate:** The ability to communicate professional work in an appropriate format.
4. **Global Citizenship:** An understanding of the responsibilities to enhance the quality of life of the global community through the practice of engineering.

The following table contains a summary of the how students were assessed at the end of their study period.

Desired Outcome	Average Score out of 4.0
1. Knowledge Base	3.5
2. Conceptualize & Design	3.5
3. Communicate	3.5
4. Global Citizenship	3.3

All students scored 3 or higher on each outcome. The Masters in EE programs are producing students that are meeting or exceeding the desired outcomes.

Summary of Faculty Discussion:

At the first faculty meeting of each semester, the Assessment Committee presents assessment data from the previous semester and facilitates discussion if any changes might be needed. No changes were proposed.

Summary of Changes/Improvements Being Considered:

There have been no changes in the last year.

Inter-rater Reliability:

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Closing the Loop:

There have been no changes in the last year.

Electrical Engineering PhD

Assessment Report Contact: James Frenzel

Program Changes in Past Year:

There have been no changes in the last year.

Learning Outcomes are Communicated to All Students in Program (check box if true): true

Learning Outcomes are Communicated to All Faculty (check box if true): true

Optional: Framework Alignment: None

Import Outcomes Data (from Anthology Outcomes):

The desired student outcomes for a Ph.D. in Electrical Engineering are:

- Knowledge Base:** An in-depth knowledge of the degree subject matter, integrating and building upon the foundation provided by a relevant undergraduate degree.
- Conceptualize and Design Projects:** The ability to use the results of applied research and other existing information necessary to carry an engineering project from conceptual through the design and production phases.
- Communicate:** The ability to communicate professional work in an appropriate format.
- Global Citizenship:** An understanding of the responsibilities to enhance the quality of life of the global community through the practice of engineering.

Summary of Student Learning:

The desired student outcomes for a Ph.D. in Electrical Engineering are:

- Knowledge Base:** An in-depth knowledge of the degree subject matter, integrating and building upon the foundation provided by a relevant undergraduate degree.
- Conceptualize and Design Projects:** The ability to use the results of applied research and other existing information necessary to carry an engineering project from conceptual through the design and production phases.
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2. Conceptualize & Design	4.0
3. Communicate	3.0
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All students scored 3 or higher on each outcome. The Ph.D. in EE program is producing students that are meeting or exceeding the desired outcomes.

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Closing the Loop:

There have been no changes in the last year.

Computer Engineering BS

Assessment Report Contact: James Frenzel

Program Changes in Past Year:

There have been no changes in the last year.

Learning Outcomes are Communicated to All Students in Program (check box if true): true

Learning Outcomes are Communicated to All Faculty (check box if true): true

Optional: Framework Alignment: ABET

Import Outcomes Data (from Anthology Outcomes):

Computer Engineering Student Outcomes: (The numbers in the parentheses indicate which Program Educational Objectives/Goals that each outcome supports)

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (1)
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The Department of ECE's BS in Computer Engineering ABET self study is attached. It gives detail of what, when, and how data are collected and used to continuously improve the BS Degree Program in Computer Engineering.

Computer Engineering Program Educational Objectives/Goals:

Within a few years of completing their Computer Engineering degrees at the University of Idaho, our graduates are, collectively, expected to:

1. Engage and contribute solutions to the latest problems in industry, government, non-profit organizations or academia through application of their engineering knowledge;
2. Continue their professional growth through graduate studies, professional training, and other educational opportunities; and
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[ECE 341 CompE Outcome \(6\) - S21.doc](#)

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Closing the Loop:

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Attached Files

[CompE-JFF-27Jun2019.pdf](#)

Computer Engineering ME/MS

Assessment Report Contact: James Frenzel

Program Changes in Past Year:

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Learning Outcomes are Communicated to All Students in Program (check box if true): true

Learning Outcomes are Communicated to All Faculty (check box if true): true

Optional: Framework Alignment: None

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The desired student outcomes for a Masters in Computer Engineering are:

1. **Knowledge Base:** An in-depth knowledge of the degree subject matter, integrating and building upon the foundation provided by a relevant undergraduate degree.
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3. **Communicate:** The ability to communicate professional work in an appropriate format.
4. **Global Citizenship:** An understanding of the responsibilities to enhance the quality of life of the global community through the practice of engineering.

The following table contains a summary of the how students were assessed at the end of their study period. Only one student finished a Masters in Computer Engineering during the time of review and there scores indicate that the Masters in Computer Engineering program needs to improve.

Desired Outcome	Average Score out of 4.0
1. Knowledge Base	2.0
2. Conceptualize & Design	2.0
3. Communicate	2.0
4. Global Citizenship	3.0

Summary of Faculty Discussion:

At the first faculty meeting of each semester, the Assessment Committee presents assessment data from the previous semester and facilitates discussion if any changes might be needed. No changes were proposed.

Summary of Changes/Improvements Being Considered:

There have been no changes in the last year.

Inter-rater Reliability:

The Assessment Committee reviews each faculty's evaluation of student outcomes and provides direct feedback to the faculty members if required. If there is not positive response from the faculty member, the committee refers the issue to the Department Chair and the Chair works with the faculty member until the issue is resolved.

Closing the Loop:

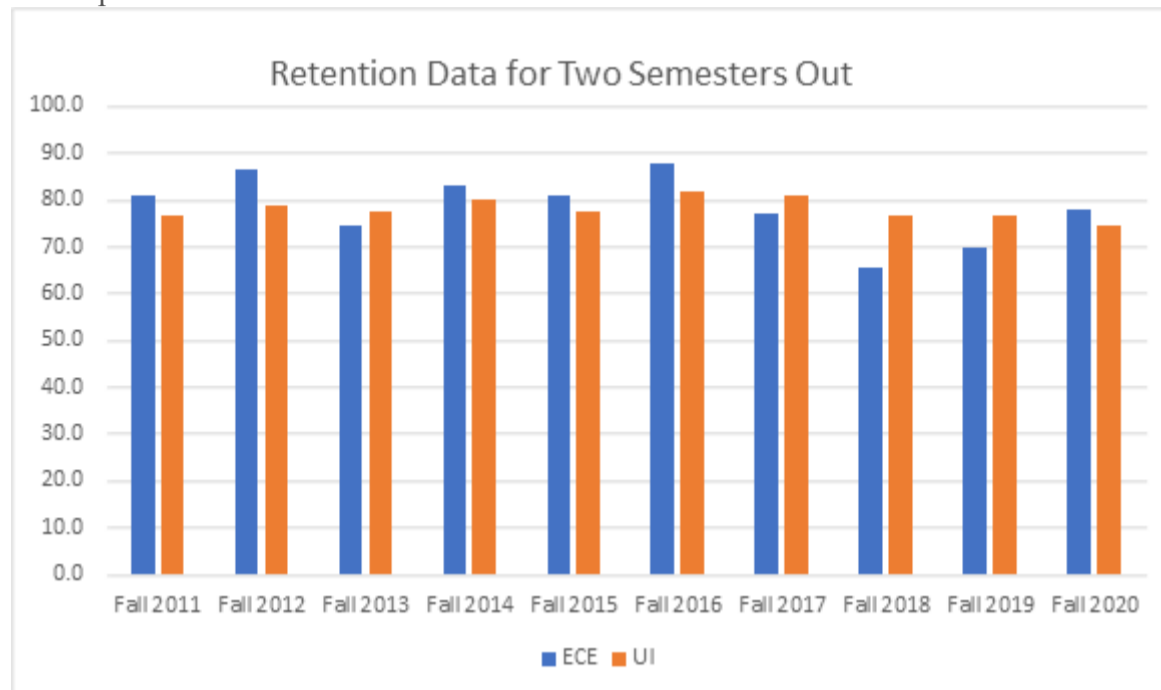
There have been no changes in the last year.

Student Achievement

New Student Achievement Item

Student Retention:

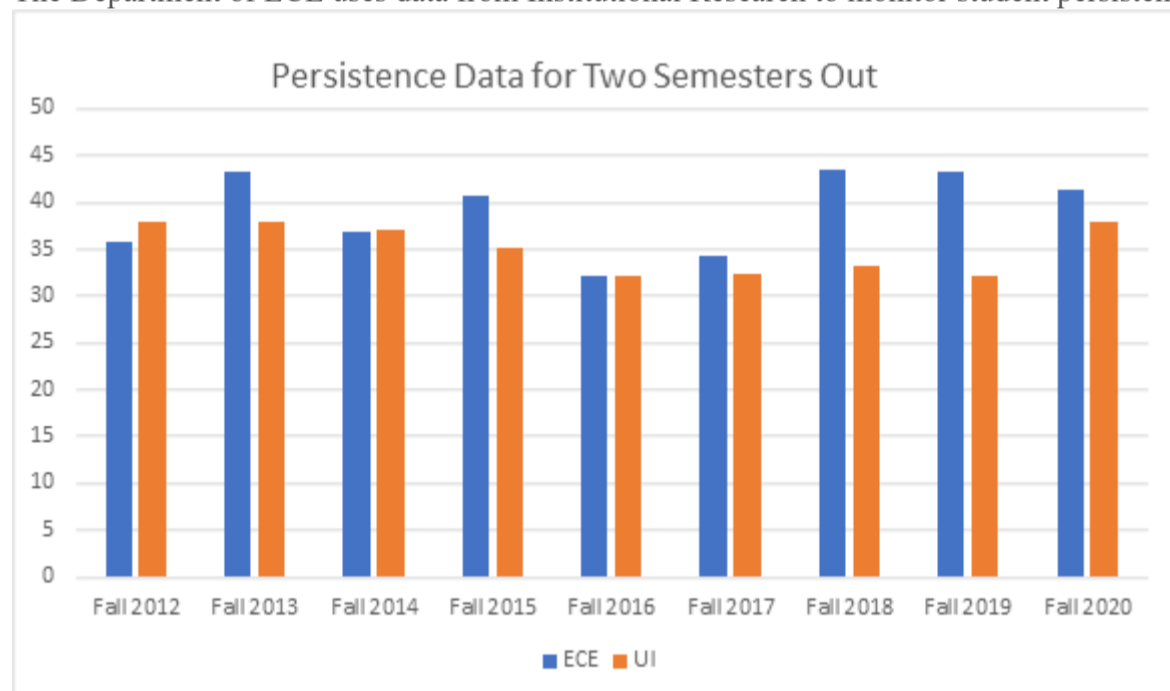
The Department of ECE uses data from Institutional Research to monitor student retention.



The percentage of Department of ECE new first year students retained has varied from a low of 65.5% to a high of 87.9%. There is no significant trend over time. The average over 10 years of the Department of ECE's two semester retention is 78.5% compared to 78.0% for all UI students.

Student Persistence:

The Department of ECE uses data from Institutional Research to monitor student persistence.



The percentage of Department of ECE new first year students has varied from a low of 32.2% to a high of 43.4%. There is no significant trend over time. The average over nine years of the Department of ECE's two semester persistence is 39.0% compared to 35.0% for all UI students.

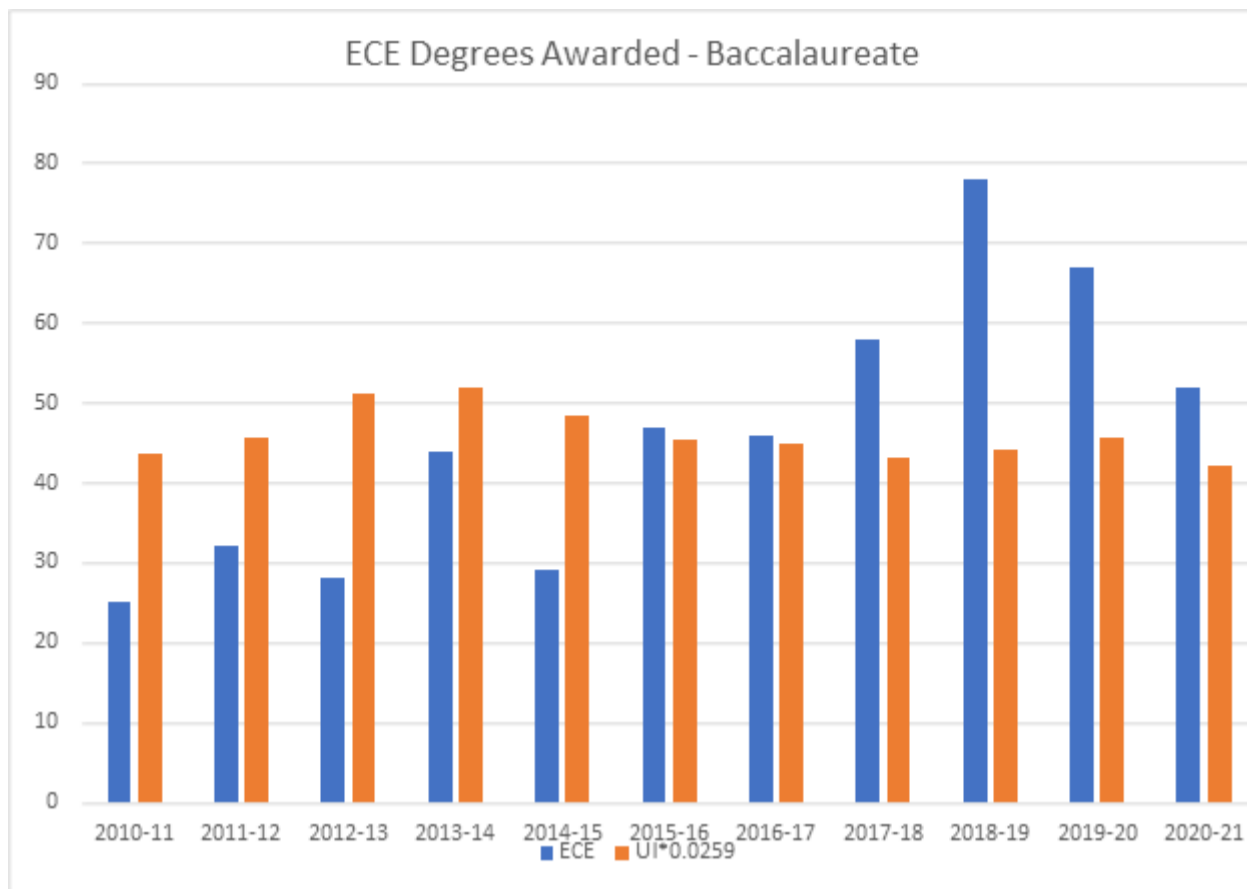
Student Completion:

The Department of ECE uses Degrees Awarded data from Institution Research's website:

<https://www.uidaho.edu/provost/ir/institutional-data/degrees-awarded>

to monitor student completion.

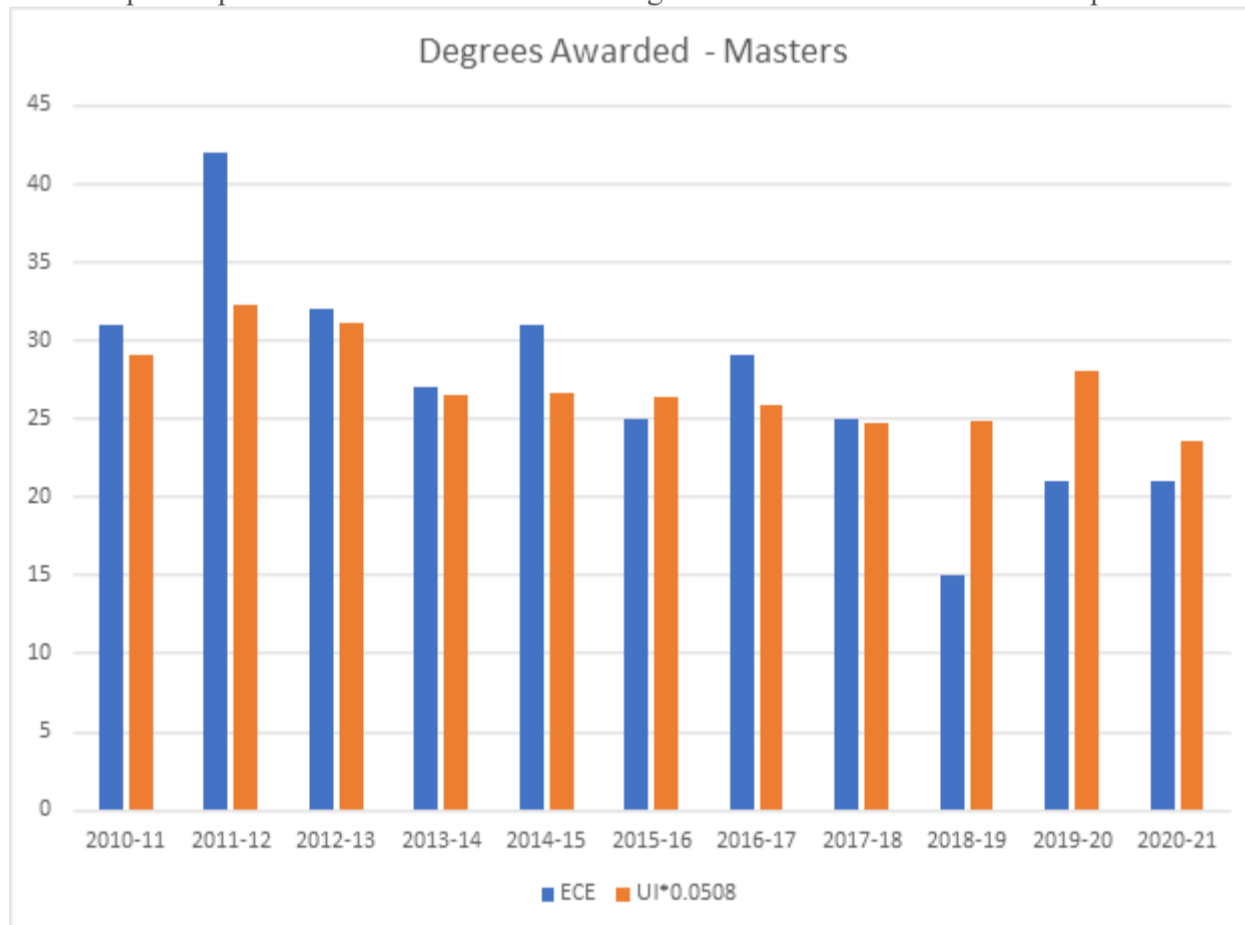
The number of Department of ECE Baccalaureate degrees awarded are compared to the number of Baccalaureate degrees awarded by the Department of ECE versus the number of Baccalaureate degrees awarded by UI multiplied by 0.0259 in the graph shown below. The multiplier, 0.0259, is the average number of Baccalaureate degrees awarded by the department over 11 years divided by the average number of Baccalaureate degrees awarded by UI over 11 years. The multiplier represents the fraction of Baccalaureate degrees that UI awards from the Department of ECE.



The number of Baccalaureate degrees awarded to Department of ECE students has in general increased in number and as a fraction of the Baccalaureate degrees over by UI over the last 11 years. The “surge” in number of degrees awarded in 2017-18, 2018-19, 2019-20 is due to China 3+1 students. The number of China 3+1 students has dropped by approximately one-seventh due to Covid-19 in 2020-21.

Masters

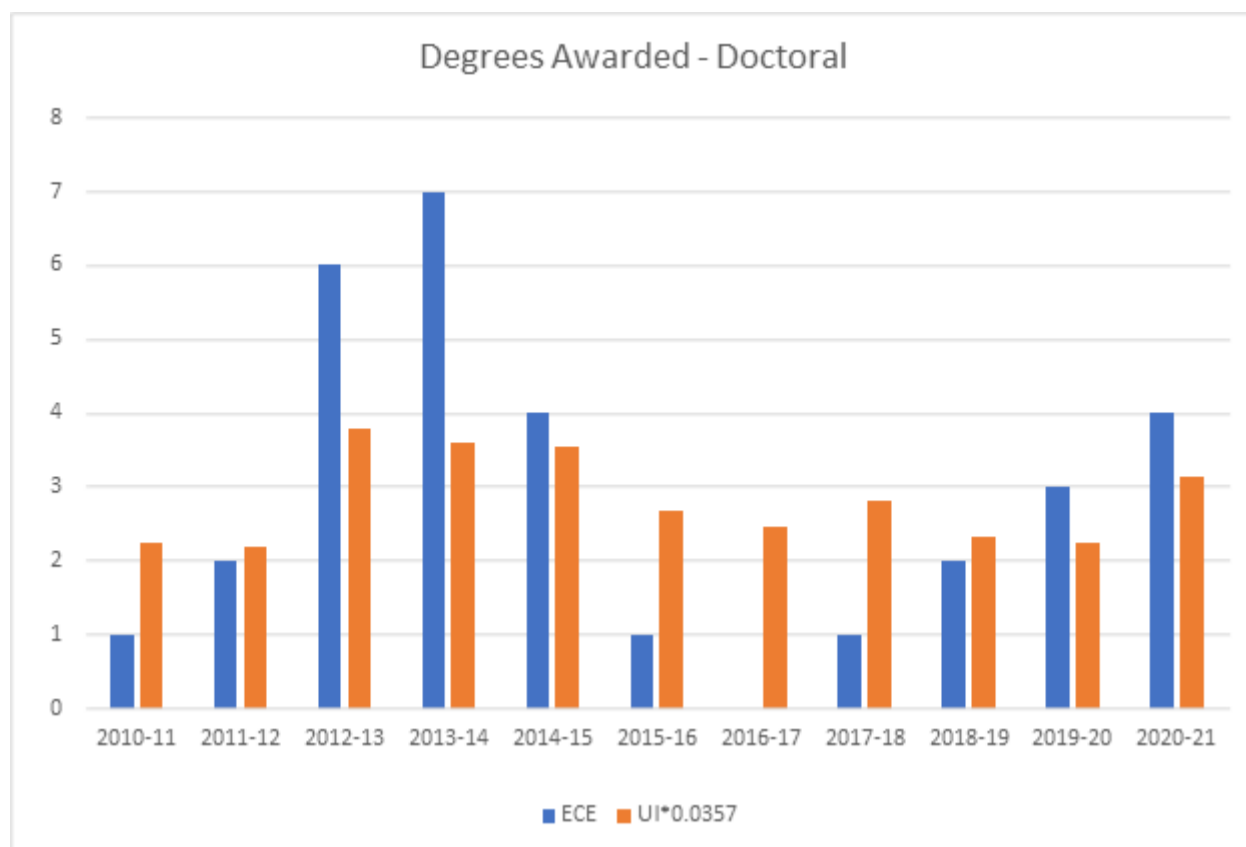
The number of Department of ECE Master degrees awarded are compared to the number of Master degrees awarded by the Department of ECE versus the number of Master degrees awarded by UI multiplied by 0.0508 in the graph shown below. The multiplier, 0.0508, is the average number of Baccalaureate degrees awarded by the department over 11 years divided by the average number of Master degrees awarded by UI over 11 years. The multiplier represents the fraction of Master degrees that UI awards due to the Department of ECE.



The number of Master degrees awarded to Department of ECE students has in general decreased in number and as a fraction of the Baccalaureate degrees over by UI over the last 11 years.

Doctoral Degrees

The number of Department of ECE Doctoral degrees awarded are compared to the number of Master degrees awarded by the Department of ECE versus the number of Doctoral degrees awarded by UI multiplied by 0.0508 in the graph shown below. The multiplier, 0.0508, is the average number of Doctoral degrees awarded by the department over 11 years divided by the average number of Doctoral degrees awarded by UI over 11 years. The multiplier represents the fraction of Doctoral degrees that UI awards due to the Department of ECE.



The number of Doctoral degrees awarded to Department of ECE students surged in 2012-13 and 2013-14. The trend over the last five years is positive.

Student Postgraduate Success:

Over the last five years within six months of graduation over 85% of Department of ECE students that have been awarded Baccalaureate degrees have a job, are accepted in to graduate school, or are on active duty in the military. This data is obtained from a College of Engineering senior survey.

Identify Equity Gaps:

The following GPA data was taken from the APR Dashboard: Equity Gaps

Race/Ethnicity	Average UG Cum GPA	Average Incoming UG GPA
White	3.35	3.45
Asian	3.63	3.86
American Indian or Alaska Native	3.22	2.72
Native Hawaiian or other Pacific Islander	2.86	0
Hispanic/Latino	4	0
Unknown	3.74	0

The number of Department of ECE students in several race/ethnicity categories (one or zero) is too low to draw significant conclusions based on Race/Ethnicity.

Race/Ethnicity	Undergraduate	Graduate
White	68	38
Asian	8	15
American Indian or Alaska Native	1	0
Native Hawaiian or other Pacific Islander	1	0
Hispanic/Latino	1	0
Unknown	13	12

The number of Department of ECE female and male student are statistically significant as show in the table below. The average undergraduate cumulative GPA of female students is 1.4% greater than for male students.

Gender	Undergraduate	Graduate
Female	8	14
Male	80	50

Gender	Average UG Cum GPS
Female	3.44
Male	3.39

Effective Learning Environment and Closing Equity Gaps:

All faculty who teach first and second year students have taken the Safe Zone Training. Approximately two thirds of the faculty who advise first and second year students have taken the Safe Zone Training.

The diversity of the Department of ECE faculty (European males-6, European female-1, People’s Republic of China male-2, Republic of China male-1, Turkish male-1, Iranian male-1, Algerian male-1) contributes to the effective learning for most students.

The Department of ECE encourages and supports student involvement in National Society of Black Engineers, NSBE; and the Society of Women Engineers, SWE; and Society of Hispanic Professional Engineers, SHPE.

No equity gaps were identified.

Demand and Productivity

New Demand and Productivity Item

External Demand:

Completion

The following table shows the percentage of students completing courses by semester for Department of ECE students and for all UI students.

	<i>% Course Completion, ECE</i>	<i>% Course Completion, UI</i>
<i>Summer 2020</i>	<i>92.3</i>	<i>92.3</i>
<i>Fall 2020</i>	<i>94.7</i>	<i>87.1</i>
<i>Spring 2021</i>	<i>95.2</i>	<i>88.8</i>

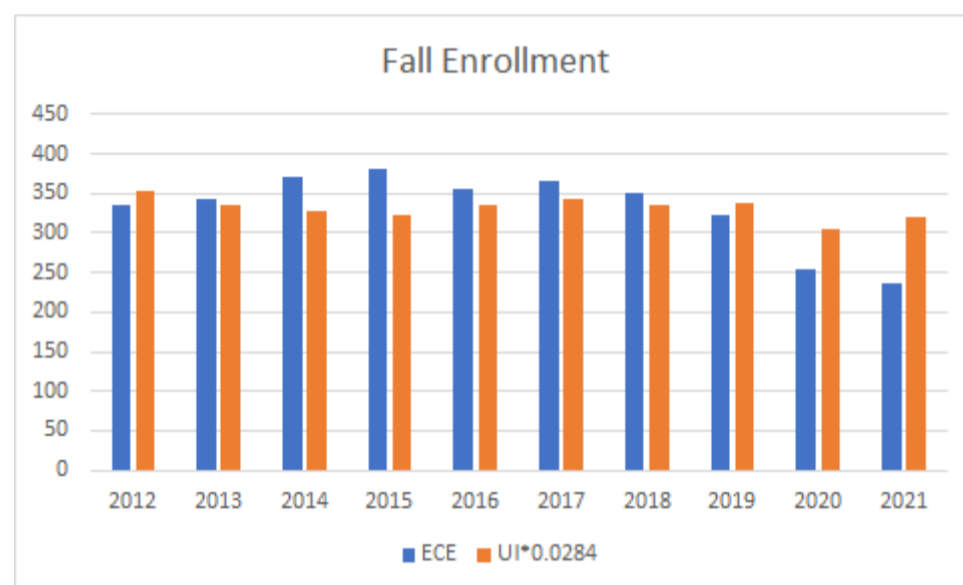
For the fall and spring semesters the Department of ECE students complete courses at a rate approximately 7% higher than all UI students.

Enrollment

The following graph shows the number of Department of ECE students compared to the number of students enrolled at the UI multiplied by 0.0284. The multiplier, 0.0284, is the average number of students enrolled in the department over 10 years divided by the average number of enrolled in the UI over 10 years. The multiplier represents the fraction of UI students enrolled in the Department of ECE.

Total Enrollment

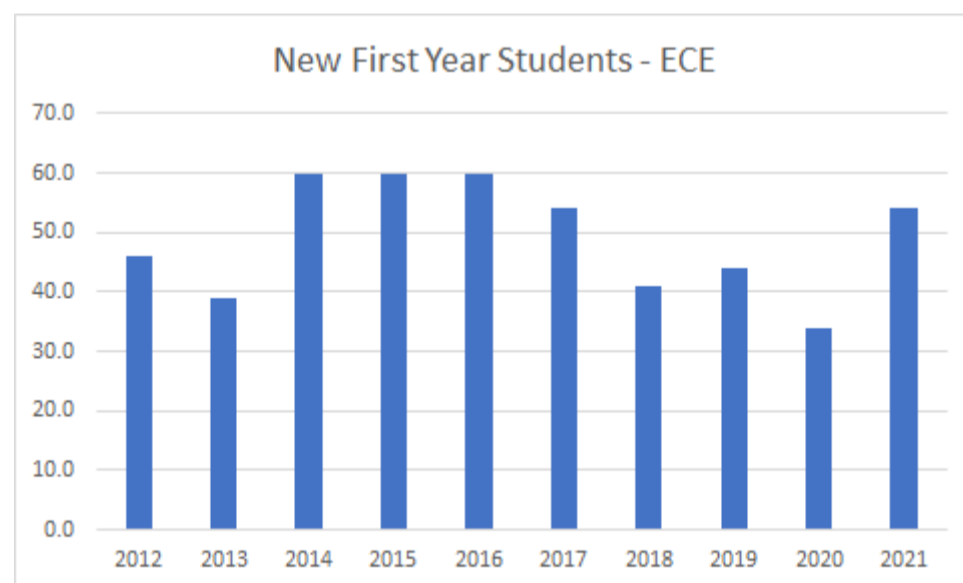
The following graph shows the number of new first year Department of ECE students.



The general trend is a decrease in students enrolled in the Department of ECE over the last five years.

New First Year Students

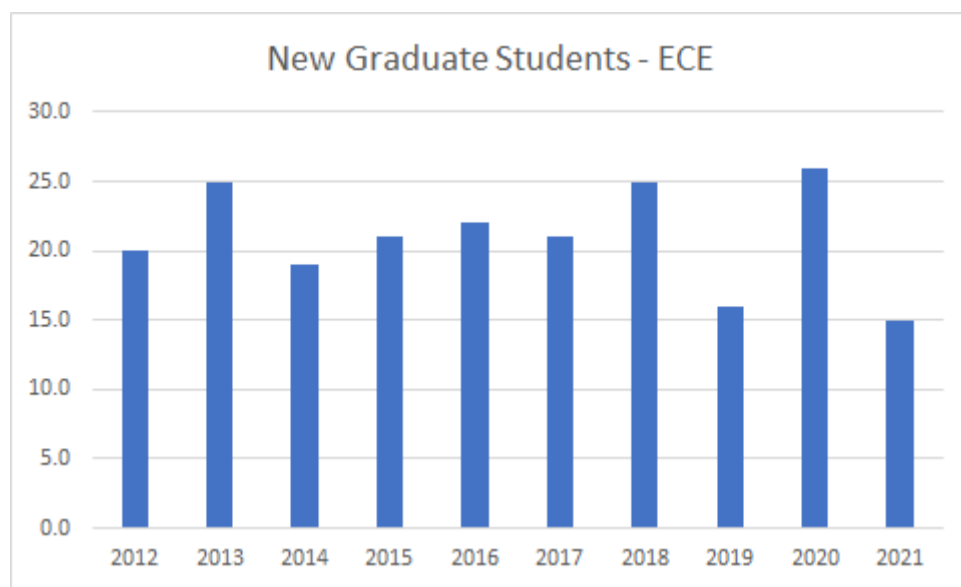
The following graph shows the number of new first year Department of ECE students.



There is a general downward trend from Fall 2016 to Fall 2020 in new first year students. New students increased by 59% from Fall 2020 to Fall 2021 following significant Department of ECE involvement in Spring 2021 and Summer 2021 admitted to enrolled efforts. It will take several years for increased first year enrollments to affect the overall enrollment numbers.

New Graduate Students

The following graph shows the number of new first year Department of ECE graduate students.

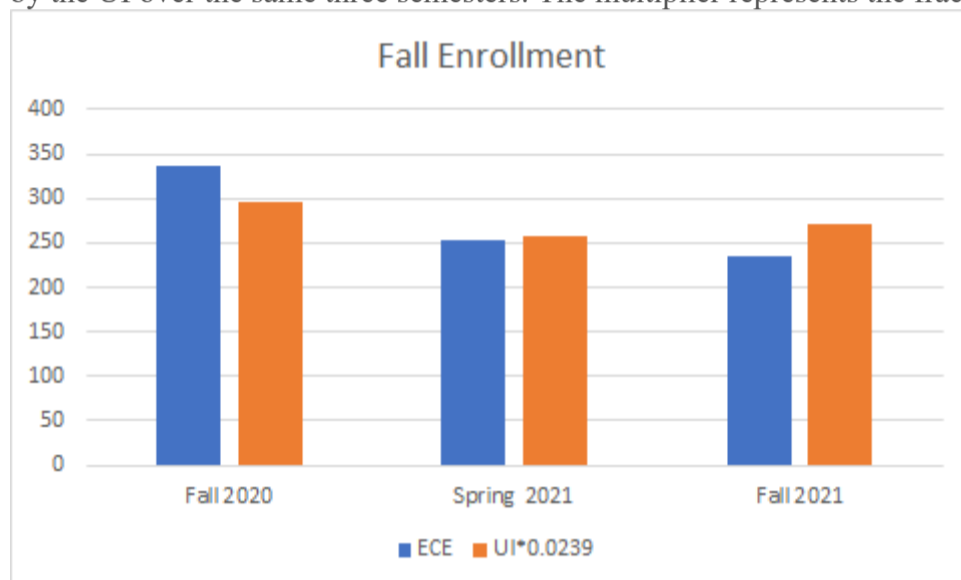


The number of new graduate students in the fall semesters has varied over the past 10 years with a slight downward trend.

Internal Demand:

Credit Hour Production

The following graph shows the credit hour production of the Department of ECE and the credit hour production of the UI multiplied by 0.0239. The multiplier, 0.0239, is the average number of credit hours offered by the department over three semesters divided by the average credit hours offered by the UI over the same three semesters. The multiplier represents the fraction of UI credit hours offered by the Department of ECE.



The general trend of the Department of ECE credit hour production is decreasing. The number of credit hours offered by the UI increased slightly in Fall 2021. The first-year student enrollment in the Department of ECE increased Fall of 2021, but the vast majority of credit hours offered by the Department of ECE are in upper division courses, so there will be a two year lag in increased credit hour production after increased first year student enrollment.

Students from other programs and/or general education virtually never take ECE courses.

Credit Productivity:

Students from other programs and/or general education virtually never take ECE courses.

Department of ECE undergraduate students significantly impact the credit hour production of the College of Science. In particular, the Department of ECE undergraduate student take many Math and Physics courses.

Financial Health and Resources

New Financial Health and Resources Item

Financial Health:

The Department of ECE is effectively delivering its programs, but we are short of both faculty and administrative/technical support resources. The Department needs at least 2 additional faculty, and 2 support staff (including a dedicated technician) to effectively grow enrollments and research expenditures. The cost of being short of resources is low morale and necessitates reduced number and diversity of upper division and graduate course offerings, making us less attractive to potential students.

Efficient Use of Resources:

The Department of ECE does its best to efficiently use the resources provided. Greater than 99% of the general education budget is for faculty (12.75 FTE) and staff (1 FTE) salaries. Faculty teach courses and advise students (57.4%), perform research (33.3%), and provide service and leadership (9.3%).

The Department Chair in consultation with the Dean of the College of Engineering and individual faculty members decides on the percentage of time each faculty member is assigned to the different job functions. The Chair performs this task in a manner to optimize the use of faculty to meet the Mission and Goals of the Department of ECE. Annual reviews are conducted by the Chair (in consultation with the Dean of the college) of each faculty and staff member on an annual basis. Any faculty member not meeting expectations is provided assistance the following year to improve their performance.

Teaching and Advising (An average of 57.4% of faculties time: 7.31 FTE's)

Faculty are generally expected to teach 2 courses per semester for a 55% teaching responsibility. They are responsible to determine course objectives, methods of teaching, and the subject matter covered. They make their courses organized, relevant, and engaging to students. During the Fall 2021 Semester the average course load per faculty member was 2.6 courses. A 0.6 teaching overload has a negative impact on moral and performance.

Thirty-two percent of the courses taught were courses required for a Baccalaureate degree. Thirty-eight percent of the courses taught were senior level courses that could be used as a one of 18 credits of required technical electives for a Baccalaureate degree or used towards a graduate degree. Twenty-nine percent of the courses taught were graduate courses.

Faculty provide accurate and knowledgeable academic and career planning assistance during student advising.

Research (An average of 33.3% of faculties time: 4.25 FTE's)

Faculty publish peer-reviewed papers, obtain external sources of funding at a level to sustain their research program by funding graduate students and other expenses such as equipment, and travel. They mentor and support both M.S. and Ph.D. graduate students.

The faculty advised graduate students and taught the required courses to enable an average of 27.2 Masters degrees/year and 2.81 Ph.D. degrees/year over the last eleven years.

Service and Leadership (An average of 9.3 % of faculties time: 1.29 FTE's)

A significant portion (0.5 FTE) of the FTE's for Service and Leadership are for the Chair to provide Leadership. Faculty service on department, college, and university committees. They are active in professional societies relevant to their research. They are active in faculty governance.

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